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Form 801A

DEPARTMENT OF COMMERCE
STEAMBOAT INSPECTION SERVICE

# GENERAL RULES AND REGULATIONS

PRESCRIBED BY THE

# BOARD OF SUPERVISING INSPECTORS

## OCEAN AND COASTWISE

APRIL 10, 1928

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DEPARTMENT OF COMMERCE
STEAMBOAT INSPECTION SERVICE

OCEAN AND COASTWISE

# GENERAL RULES AND REGULATIONS

PRESCRIBED BY THE

# BOARD OF SUPERVISING INSPECTORS

AS AMENDED AT BOARD MEETING
OF JANUARY, 1928

▽

EDITION : APRIL 10, 1928

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## AMENDED STEAMBOAT INSPECTION RULES AND REGULATIONS, OCEAN AND COASTWISE.

The General Rules and Regulations prescribed by the Board of Supervising Inspectors are divided into four books, namely, (1) Ocean and coastwise, (2) Great Lakes, (3) Bays, sounds, and lakes other than the Great Lakes, and (4) Rivers.

This book contains the ocean and coastwise rules.

Rule III herein is divided into two parts, "Ocean" and "Coastwise."

This edition contains all amendments of the ocean and coastwise rules and regulations made by the Board of Supervising Inspectors at the meeting of January, 1928, and by the executive committee of the board at the meetings of February 7; April 4, 5, 23, and 24; October 1, and November 9 and 10, 1927, published in the forty-second, forty-third, and forty-fourth supplements to General Rules and Regulations. This edition also contains lists of all approved vessel equipments.

The amendments of the rules and regulations above referred to have been approved by the Secretary of Commerce, and have the force of law, under the provisions of section 4405, Revised Statutes, and must be observed accordingly.

# OFFICERS OF THE STEAMBOAT INSPECTION SERVICE.[1]

DICKERSON N. HOOVER, *Supervising Inspector General,*
A. E. KEYSER, *Administrative Assistant,*

*Washington, D. C.*

*Traveling inspectors in office of Supervising Inspector General.*—Earl B. Hull, Harry W. Ravens, Chester W. Willett.

*Clerks in office of Supervising Inspector General.*—Gertrude F. Brown, Frederick J. de Moll, Ida E. Barnhart, Lillian O. Bernard, Mary H. Gillis, Gertrude M. Goll, Violet Wiks, Mary R. Matheny, Helen E. Morris.

*Messenger.*—Alfred D. Clarke.

## SUPERVISING INSPECTORS.

*First district.*—John K. Bulger, San Francisco, Calif.
*Second district.*—John L. Crone, New York, N. Y.
*Third district.*—Alexander O. Calcott, Norfolk, Va.
*Fourth district.*—William J. Macdonald, St. Louis, Mo.
*Fifth district.*—Oscar G. Haines, Boston, Mass.
*Sixth district.*—George M. Green, Louisville, Ky.
*Seventh district.*—Harry Layfield, Pittsburgh, Pa.
*Eighth district.*—Fred J. Meno, Detroit, Mich.
*Ninth district.*—Nils B. Nelson, Cleveland, Ohio.
*Tenth district.*—Cecil N. Bean, New Orleans, La.
*Eleventh district.*—William Fisher, Seattle, Wash.

## ASSISTANT INSPECTORS TESTING MARINE BOILER MATERIAL AT MILLS.

Charles W. Beach, Chicago, Ill.
Roy B. Huston, Cleveland, Ohio.
Richard K. Griswold, Coatesville, Pa.
Samuel A. Mills, Philadelphia, Pa.
Frederick R. Kay, Pittsburgh, Pa.

## LOCAL INSPECTORS.

| District. | Port. | Of hulls. | Of boilers. |
|---|---|---|---|
| First | San Francisco, Calif. | Frank H. Turner | Joseph P. Dolan. |
| | Do | Charles F. Herriman, assistant | Winslow D. Conn, assistant. |
| | Do | Charles F. Austin, assistant | Henry V. Barbieri, assistant. |
| | Do | Thomas J. Sullivan, assistant | Charles T. Tiernan, assistant. |
| | Do | John P. Tibbetts, assistant | Charles J. McDonald, assistant. |
| | Do | Axel R. Cahling, assistant | Ralph M. Robison, assistant. |
| | Do | Frank G. Bucknam, assistant | Herman Rorquist, assistant. |
| | Honolulu, Hawaii | Robert T. Bain | Clarence King. |
| | Los Angeles, Calif. | Samuel A. Kennedy | Joseph A. Moody. |
| | Do | John Dahl, assistant | James F. Smith, assistant. |
| | Do | Herbert E. Boyce, assistant | |

[1] List of officers corrected to Apr. 10, 1928.

*Local inspectors*—Continued.

| District. | Port. | Of hulls. | Of boilers. |
|---|---|---|---|
| First (con.) | Portland, Oreg. | Frank X. Edthofer | John E. Wynn. |
| | Do. | Hagen F. C. Astrup, assistant | Frank N. Rogers, assistant. |
| | Do. | George W. Morgan, assistant | George Q. Weldin, assistant. |
| Second | New York, N. Y. | George T. Charlton | William H. Powers. |
| | Do. | Joseph Watkinson, assistant | George L. Scheer, assistant. |
| | Do. | Frank J. Smith, assistant | John B. Riley, assistant. |
| | Do. | Hector R. Campbell, assistant | James Smith, assistant. |
| | Do. | Walter E. Disley, assistant | James W. Wilson, assistant. |
| | Do. | John J. Grady, assistant | Allen D. Fitzgerald, assistant. |
| | Do. | Alan S. Johnstone, assistant | Frederick L. Dennis, assistant. |
| | Do. | Charles M. Bunce, assistant | John Egan, assistant. |
| | Do. | George N. Francisco, assistant | William G. Fenwick, assistant. |
| | Do. | Whidden A. Harvey, assistant | Patrick J. Hunt, assistant. |
| | Do. | Henry Wellman, assistant | Frank Kelly, assistant. |
| | Do. | Thomas F. Dalton, assistant | John L. Moran, assistant. |
| | Do. | Edward Keane, assistant | Matthew Sloan, assistant. |
| | Do. | Charles F. Fornason, assistant | John W. Waters, assistant. |
| | Do. | Albert E. Redifer, assistant | Philip J. O'Reilly, assistant. |
| | Do. | James H. Bethel, assistant | |
| | Do. | Thomas H. Foster, assistant | Richard K. Griswold,[1] assistant. |
| | Do. | Cornelius H. Smith, assistant | Frederick R. Kay,[2] assistant. |
| | Albany, N. Y. | Thomas E. Norton | Nathan H. Dunn. |
| | Do. | Andrew J. Kelley, assistant | Thomas J. Riley, assistant. |
| | New Haven, Conn. | Alva R. Chapman | Harvey C. Colgin. |
| | Philadelphia, Pa. | Redford A. Sargent | John E. Wilson. |
| | Do. | Joseph T. Drake, assistant | James H. Durborough, assistant. |
| | Do. | A. T. Rudolph Berger, assistant | Christian C. Stricker, assistant. |
| | Do. | Frank H. Demke, assistant | Harvey K. Carter, assistant. |
| | Do. | George H. Toon, assistant | M. Alexander Monsell, assistant. |
| | Do. | Harry S. Miller, assistant | Edgar T. West, assistant. |
| | Do. | Norman P. Mason, assistant | Samuel A. Mills, assistant. |
| | Do. | John R. Borum, assistant | Ross G. Willoh, assistant. |
| Third | Norfolk, Va. | John E. Tarkenton | Thomas J. Hanlon. |
| | Do. | William B. Hogg, assistant | William H. Sebrell, assistant. |
| | Do. | Howard E. Simmons, assistant | Charles P. Etheridge, assistant. |
| | Do. | | Henry L. Simpson, assistant. |
| | Do. | Walter N. Marshall, assistant | Burton C. Stiff, assistant. |
| | Baltimore, Md. | Paul H. Tyler | David C. Young. |
| | Do. | Young D. Griffiss, assistant | John T. Loveless, assistant. |
| | Do. | John M. Wheeler, assistant | John Milne, assistant. |
| | Do. | Jesse B. Reynolds, assistant | John W. S. Murphy, assistant. |
| | Do. | Osborn H. Simmons, assistant | John W. Banks, assistant. |
| | Charleston, S. C. | Frank Comforter | Edward R. Misset. |
| | Jacksonville, Fla. | Spencer L. Houston | John H. Nolan. |
| | Savannah, Ga. | William G. Lee | Henry H. Hay. |
| | Do. | Frederick A. MacGurn, assistant | Thomas J. Haley, assistant. |
| Fourth | St. Louis, Mo. | Alvah O. Day | |
| | Dubuque, Iowa. | George B. Knapp | Harrison M. Suiter. |
| Fifth | Boston, Mass. | Herman T. Parker | John Stewart. |
| | Do. | Charles Lyons, assistant | John Barrett, assistant. |
| | Do. | Halert C. Shepheard, assistant | George W. Callbeck, assistant. |
| | Do. | Olaf B. Borgeson, assistant | Charles W. Russell, assistant. |
| | Bangor, Me. | Lorenzo M. Crowell | Silas M. Boothby. |
| | New London, Conn. | John A. MacDonald | John A. Brooks. |
| | Portland, Me. | Osmyn Berry | Walter L. Blaisdell. |
| | Do. | Manly F. Littlefield, assistant | William B. Young, assistant. |
| | Providence, R. I. | Robert B. Clark | Richard F. Bailey. |
| | Do. | William F. Driscoll, assistant | James F. Rawdon, assistant. |
| | Do. | Frederick S. Walker, assistant | Robert E. Coombs, assistant. |
| Sixth | Louisville, Ky. | Edward Maurer | Isaac W. Betts. |
| | Evansville, Ind. | Benjamin I. Pattison | Baylor Spratt. |
| | Memphis, Tenn. | John B. Wyckoff | Charles T. Greenwood. |
| | Nashville, Tenn. | William T. Hunter | William P. Fiske. |
| Seventh | Pittsburgh, Pa. | Edward L. Shaw | George E. Berry. |
| | Cincinnati, Ohio. | John K. Peyton | George W. Dameron. |
| | Point Pleasant, W. Va. | Harry H. Pullem | Charles G. Thomas. |
| Eighth | Detroit, Mich. | William T. Kiel | William H. Dungan. |
| | Do. | Cyril E. Bowerman, assistant | Albert C. Kelke, assistant. |
| | Do. | George Cummings, assistant | Hugh Kelly, assistant. |
| | Chicago, Ill. | John F. Hansen | William Nicholas. |
| | Do. | Edward J. Fitzgerald, assistant | Thomas R. Martin, assistant. |
| | Do. | James F. Mackin, assistant | Charles W. Beach, assistant. |
| | Duluth, Minn. | Dennis T. Sullivan | Neil Patterson. |
| | Grand Haven, Mich. | Bernard J. Gellick | Hugh P. Mulligan. |
| | Do. | Peter Thompson, assistant | Edgar G. Ewing, assistant. |
| | Marquette, Mich. | John H. Hansen | Alfred G. Knights. |
| | Milwaukee, Wis. | Frank W. Van Patten | William A. Collins. |
| | Do. | Henry Erichsen, assistant | James McK. Hunter, assistant. |
| | Do. | Michael J. Kentos, assistant | Abraham Auld, assistant. |
| | Port Huron, Mich. | Peter Larson | Walter Greenwood. |

[1] Detailed to Coatesville, Pa.

[2] Detailed to Pittsburgh, Pa.

*Local inspectors*—Continued.

| District. | Port. | Of hulls. | Of boilers. |
|---|---|---|---|
| Ninth | Cleveland, Ohio | Thomas W. Gould | Silas H. Hunter. |
| | | William H. Stern, assistant | Roy B. Huston, assistant. |
| | | Frank J. McCarty, assistant | Robert H. Benham, assistant. |
| | | David A. Curran, assistant | Charles A. Tyler, assistant. |
| | Buffalo, N. Y | James M. Todd | William P. Nolan. |
| | Do | John A. Connelly, assistant | John W. Mark, assistant. |
| | Do | Iver Rolseng, assistant | William T. Smith, assistant. |
| | Do | Moses Boggan, assistant | Byron A. Minor, assistant. |
| | Oswego, N. Y | Joseph C. Dobson | Albert C. Brockner. |
| | Toledo, Ohio | Henry Johnson | Wallace Tomey. |
| | Do | Kolbjorn Hansen, assistant | Magnus E. Schladetsch, assistant. |
| Tenth | New Orleans, La | Arthur V. Hulme | James B. Cobb. |
| | Do | Everett B. Thomas, assistant | Francis W. Sadler, assistant. |
| | Do | Martin M. Sorenson, assistant | Alexander S. Gassaway, assistant. |
| | Do | Samuel O. Larche, assistant | Walter R. Watson, assistant. |
| | Galveston, Tex | Andrew A. Miranda | Hugha F. Cobb. |
| | Do | William H. Yent, assistant | Paul A. Larche, assistant. |
| | Mobile, Ala | Henry O. Lueders | Thomas W. Reynolds. |
| | Do | Owen F. Fisher, assistant | John C. Houston, assistant. |
| | San Juan, P. R | Frederick W. Richardson | Henry J. McCabe. |
| | Tampa, Fla | John R. Blair | John W. Sullivan. |
| Eleventh | Seattle, Wash | Donald S. Ames | Thomas Short. |
| | Do | Arthur Joachims, assistant | Whitmore D. Hill, assistant. |
| | Do | George Tyler, assistant | Samuel W. Thorn, assistant. |
| | Do | Martin J. Taaffe, assistant | Frank H. Newhall, assistant. |
| | Do | Daniel B. Hutchings, assistant | Richard G. Robinson, jr., assistant. |
| | Do | Francis Kelly, assistant | John F. Oettl, assistant. |
| | Do | Edward Stuart, assistant | William M. Campbell, assistant. |
| | Juneau, Alaska | George H. Whitney | John Newmarker. |
| | St. Michael, Alaska | Charles H. White | Savine L. Craft. |

## CLERKS TO LOCAL BOARDS.

Ambrose A. Clarke, San Francisco, Calif.
Daisy I. Denis, San Francisco, Calif.
James J. Robins, San Francisco, Calif.
Thelma D. Hall, San Francisco, Calif.
Elva S. Thomas, San Francisco, Calif.
Mary Hynes, San Francisco, Calif.
Susan L. Fountain, Honolulu, Hawaii.
James J. Sullivan, Los Angeles, Calif.
Clara M. Larsen, Los Angeles, Calif.
Arthur F. Merrill, Portland, Oreg.
Blanche E. Solyan, Portland, Oreg.
Thomas B. Martin, New York, N. Y.
William C. Osborne, New York, N. Y.
Joseph Specter, New York, N. Y.
Frank Dunlea, New York, N. Y.
John J. Daly, New York, N. Y.
Benjamin Kohn, New York, N. Y.
Charles Di Giovanna, New York, N. Y.
Sophie Shapiro, New York, N. Y.
Valentine Donovan, New York, N. Y.
Norman J. Brown, New York, N. Y.
Robert Johenning, New York, N. Y.
William Kanzler, New York, N. Y.
Irving Witkowsky, New York, N. Y.
Daniel J. Kelly, Albany, N. Y.
Lillian R. Simon, Albany, N. Y.
Peter W. Hanbury, New Haven, Conn.
Joseph R. Koffel, Philadelphia, Pa.
Dora Kramer, Philadelphia, Pa.
Max Abrams, Philadelphia, Pa.
George M. Kitzmiller, Norfolk, Va.
William G. Collings, Norfolk, Va.
Ruby Matthews, Norfolk, Va.
Evelyn E. Tillman, Baltimore, Md.
Christina Grabau, Baltimore, Md.
Jeannette Briskman, Baltimore, Md.
Ruth S. Woodward,[1] Baltimore, Md.
Anna C. Scott, Charleston, S. C.
Norma Davenport, Jacksonville, Fla.
Marie C. Salas, Savannah, Ga.
Frances Pursell, St. Louis, Mo.
Helen E. Delany, Dubuque, Iowa.
Edward L. Sullivan, Boston, Mass.
Mary F. Cain, Boston, Mass.
Catherine V. O'Neil, Boston, Mass.
Raymond A. Grady, Bangor, Me.
Matthew C. Graham, New London, Conn.
William H. O'Brion, Portland, Me.
Edmund P. Walker, Portland, Me.
Rose S. Melone, Providence, R. I.
Anna E. Cahir, Providence, R. I.
Lora J. Burtt, Louisville, Ky.
Leonora Veneman, Evansville, Ind.
John E. Kirkpatrick, Nashville, Tenn.
Helen J. Hamlin, Memphis, Tenn.
Henry Lindsay, Pittsburgh, Pa.
Augustus W. Snyder, Cincinnati, Ohio.
William E. Monroe, Point Pleasant, W. Va.
Ruth F. Johnson, Detroit, Mich.
Mary R. Stefanich, Detroit, Mich.
May Fiebernitz, Detroit, Mich.
Arthur E. Schutt, Chicago, Ill.
Grace Mead, Chicago, Ill.

[1] Detailed to Coatesville, Pa.

Donald McLennan, Duluth, Minn.
Elmer C. Hurless, Grand Haven, Mich.
Anna L. Kuha, Marquette, Mich.
Lee R. Whitney, Milwaukee, Wis.
Christine C. Baumstark, Milwaukee, Wis.
Myrtle V. Coulthard, Port Huron, Mich.
Mabel L. Thompson, Cleveland, Ohio.
Eva D. Lozier, Cleveland, Ohio.
Gertrude Jaffe, Cleveland, Ohio.
Margaret E. Duley, Cleveland, Ohio.
Pauline E. Flynn, Buffalo, N. Y.
Josephine R. Lillis, Buffalo, N. Y.
Margaret M. Quinlivan, Buffalo, N. Y.
Coridon F. Barlow, Oswego, N. Y.
Edward M. Mansuy, Toledo, Ohio.
George J. West, New Orleans, La.
Claire M. Lawton, New Orleans, La.
Dorathea Fielder, New Orleans, La.
Joseph G. Sherfy, Galveston, Tex.
John B. Clark, Mobile, Ala.
Percy J. McCarron, Mobile, Ala.
Jose R. Arzuaga, San Juan, P. R.
Avis V. McCaskill, Tampa, Fla.
Wesley E. Walker, Seattle, Wash.
Mildred E. Matthes, Seattle, Wash.
Edna M. Carwile, Seattle, Wash.
Lydia Knaak, Seattle, Wash.
Le Roy J. Vestal, Juneau, Alaska.
James Trail, St. Michael, Alaska.

## TERRITORY EMBRACED IN SUPERVISING DISTRICTS.

First district embraces all the waters of the United States west of the Rocky Mountains and south of a line drawn east from Cape Disappointment to the intersection of the forty-seventh parallel of north latitude and longitude 112° 30′ west, and the Hawaiian Islands.

Second district embraces all the waters of Long Island Sound west of the Connecticut River and the tributaries thereto, that portion of Long Island lying west of Riverhead, and the waters of the Atlantic coast, rivers, and tributaries from Long Island to Cape Charles, and Lake Champlain and its tributaries.

Third district embraces the waters of the Atlantic coast, rivers, and tributaries between Cape Charles and Cape Sable.

Fourth district embraces the Mississippi River and tributaries from above Greenfield, Mo., to the head of navigation on the Missouri River, and to the head of navigation on the Illinois River.

Fifth district embraces the waters of the Atlantic coast, rivers, and tributaries from the eastern boundary of the United States to and including the Connecticut River, and that portion of Long Island east of and including Riverhead.

Sixth district embraces the Ohio River and tributaries up to and including Carrollton, Ky., and the Mississippi River and tributaries from Greenville, Miss., up to and including Greenfield, Mo.

Seventh district embraces the Ohio River and tributaries above Carrollton, Ky.

Eighth district embraces all the waters of the Great Lakes north and west of Lake Erie with their tributaries.

Ninth district embraces all the waters of the River St. Lawrence, Lakes Erie and Ontario and their tributaries.

Tenth district embraces the coast and tributary waters of the Gulf of Mexico, between Cape Sable and the mouth of the Rio Grande, and the Mississippi River and tributaries to Greenville, Miss., and Porto Rico.

Eleventh district embraces all the waters in the States of Washington, Idaho, and Montana north of a line drawn east from Cape Disappointment to the intersection of the forty-seventh parallel of north latitude and longitude 112° 30′ west, and also all United States waters in the Territory of Alaska.

# GENERAL RULES AND REGULATIONS.

## OCEAN AND COASTWISE.

### Rule I.—Boiler Plate.

#### STAMPS.

1. Every iron or steel plate intended for the construction or repairs of boilers to be used on steam vessels shall be stamped by the manufacturer in the following manner, at two diagonal corners, at a distance of about 18 inches from the edges.

Plates to be used in externally fired boilers the thickness of which shall not exceed one-half inch for steamers navigated under the provisions of Title LII, Revised Statutes, which will be subject to tensile strain in said boilers, shall be tested and inspected by an inspector duly authorized under the provisions of said title, and such plates shall not be stamped until they have been tested by the inspector, and each of such plates shall then be stamped by the manufacturer in the presence of the inspector with the name of the manufacturer, the place where manufactured, and the minimum number of thousand pounds tensile stress it will bear to the sectional square inch as has been determined by the test.

Plates to be used in the construction or repair of boilers other than the externally fired boilers as described in above paragraph, for steamers navigated under provisions of Title LII, Revised Statutes, which shall be subject to tensile strain in said boilers shall be tested and inspected by an inspector duly authorized under provisions of said title and such plates shall be stamped by the manufacturer before same are tested with the name of the manufacturer, the place where manufactured, and the minimum number of pounds the plate will bear to the sectional square inch, expressed in thousands.

Inspectors testing iron or steel plate at the mills where same is manufactured shall allow the mills to shear any plate into butt straps or heads before the coupon from the plate is tested, and they shall accept the statement of the manufacturer that the coupon presented to the inspector for testing was taken from the plate from which the butt straps or heads were cut, and if the coupon meets all the requirements of Rule I, the inspector shall stamp, in one place where it is most likely to be left legible after working into the boiler, all heads and butt straps cut from the plate.

All plates which conform to the physical, chemical, and other requirements prescribed by these rules shall be stamped by the inspector near the manufacturer's stamp, with the official stamp of the United States Steamboat Inspection Service, and with the initials of his name and a serial number. (Sec. 4430, R. S.)

2. Plates may be tested and inspected at the mills for repairs to marine boilers or to be carried in stock, the report of such test to be in duplicate, one copy to be furnished through the supervising inspector to the local inspectors in the district where the purchaser of such material is located, and the other to the purchaser, who shall deliver a copy of the same to the parties using the material, who, in turn, shall submit the same to the local inspectors in the district where the material is to be used, before being assembled in the boiler. Steamers carrying such repair material to be used in emergencies shall carry the record of each sheet of such material on board. (Secs. 4430, 4431, R. S.)

3. Boilers built since February 28, 1872, of material stamped and tested according to the requirements of section 4430, Revised Statutes, and having a record thereof in the office of the local inspectors in the district where the boiler was built or intended to be used, may be used for marine purposes, notwithstanding that such boilers may have been used for other purposes, if in the judgment of the local inspectors they are deemed safe. (Sec. 4430, R. S.)

### CHEMICAL PROPERTIES, STEEL PLATES.

4. Steel plates shall be made by the open-hearth process, except that steel for plates to be used in the manufacture of boiler tubes may be made by the Bessemer process.

Open-hearth steel shall contain not more than 0.04 per cent of phosphorus nor more than 0.05 per cent of sulphur.

The manufacturer shall furnish the inspector, with each order tested, a certificate stating the process by which the steel was manufactured and a copy of the analysis of each melt. The analysis may, if deemed expedient by the Supervising Inspector General, be verified at the expense of the manufacturer. (Secs. 4405, 4430, R. S.)

### PHYSICAL PROPERTIES, STEEL PLATES.

5. All steel plates tested shall show an elongation of at least 20 per cent measured in a gauge length of 8 inches. (Sec. 4430, R. S.)

### PHYSICAL PROPERTIES, IRON PLATES.

6. The tensile strength shall be not less than 45,000 pounds per square inch. The elongation shall be not less than 15 per cent. The reduction of area shall be not less than 15 per cent for 45,000 pounds tensile strength, and for each increase of 1,000 pounds tensile strength up to 55,000 pounds, an addition of 1 shall be made to the required percentage of reduction of area. The bend test specimen shall bend cold through 90° around a curve the radius of which is not greater than one and one-half times the thickness of the specimen. (Sec. 4430, R. S.)

7. All tension test specimens shall be milled to the form as shown in figure 1, with the following dimensions: Length at least 16 inches, ends from $1\frac{1}{2}$ to $3\frac{1}{2}$ inches wide by about 3 inches in length, and parallel section at center 1 to $1\frac{1}{2}$ inches wide by 9 inches in length. The percentage of elongation shall be measured in a gauge length of 8 inches.

Where specimens are to be tested on the testing machines of the Steamboat Inspection Service, they shall be 1 inch wide at parallel section in center, and shall not exceed 2 inches in width on the ends.

All bend test specimens shall be at least 12 inches in length and from 1 to 3½ inches in width, and the full thickness as rolled. The edges may be planed. The corners shall not be rounded, but the sharpness may be removed with a fine file. After bending, the specimens shall show no cracks or flaws on the outside of the bent portion.

### TEST SPECIMENS FOR STEEL PLATES.

Two tension tests and one cold-bend test shall be made from each plate as first rolled from a billet, slab, or ingot, the tensile test specimens to be taken from two diagonal corners of the plate, and a cold-bend specimen to be taken transversely from the middle of the top of the plate.

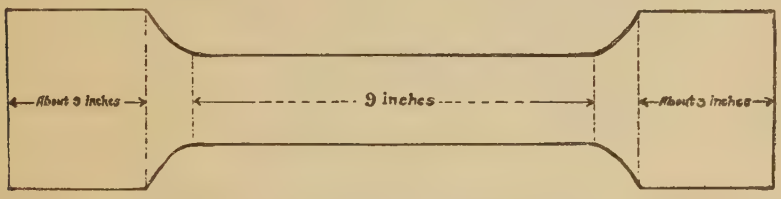



FIGURE 1.

The bend test specimen shall bend cold 180° around a pin without showing any sign of cracking or other injurious defects on the outside of the bent portion, as follows: For plates under 1 inch in thickness the diameter of the pin shall be equal to one and one-half times the thickness of the plate; for plates 1 inch and over, up to and including 1½ inches in thickness, the diameter of the pin shall be equal to three times the thickness of the plate, and for all plates over 1½ inches in thickness the diameter of the pin shall be equal to four times the thickness of the plate.

The finished material shall be free from all injurious defects, and shall have a good and workmanlike finish.

All measurements of test specimens and material shall be made by any standard American gauge, and record of tests shall be submitted on Form 934. (Secs. 4405, 4430, R. S.)

8. [Form 935.]

## AFFIDAVIT OF MANUFACTURER OF MARINE STEAM BOILERS CONSTRUCTED OF MATERIAL TESTED AT THE MILLS.

DEPARTMENT OF COMMERCE,
STEAMBOAT INSPECTION SERVICE.

STATE OF ———, *County of* ———.

On this —— day of ———, A. D. 192—, personally appeared before me, ——— ———, a notary public in and for the county of ——— and State of ———, Mr. ——— ———, who deposes and says that he is ——— ———, of ——— ———, boiler manufacotrer, and has contracted to build — marine boiler– for ——— ———, of ——— ———, from ——— plate manufactured by ——— ———, of ——— ———, which plate was tsuted at the mills by a United States assistant inspector, as provided in the act of Cengress approved January 22, 1894, each of said plates having stamped thereon the words "U. S. Assistant Inspector" and the initials, ——, and numbered as follows: ———.

No plate for shell or other part of boiler subject to tensile strain, other than herein specified, will be used in the construction of said boiler–, the lowest tensile strength stamped thereon being ——— pounds.

The dimensions of the boiler– will be: Length, ———; diameter, ———.

| | Material. | Number. | Length. | Thickness. | Diameter. |
|---|---|---|---|---|---|
| Tubes | | | | | |
| Flues | | | | | |
| Furnaces | | | | | |

Kind of furnaces,——; round, ——; corrugated, ——; flat sides, ——. Thickness of plates of cylindrical shell of boiler, ——; thickness of side sheets in flat side of furnace, ——; thickness of flat top sheet of back connection,——; thickness of plates of cylindrical shell of back connection, ——; thickness of material of boiler heads, ——; thickness of tube sheets, ——; thickness of plates of shell of steam chimney, ——; thickness of plates in lining of steam chimney, ——; thickness of side sheets, ——. Kind of rivets (iron or steel), ——; diameter of rivet holes, ——; pitch of rivets, ——. All rivet holes of boiler–, including steam and mud drums, will be fairly drilled and no part of such holes will be punched, ———; or punched, ———. All tubes used in the construction of said boiler–, are of the thickness and material required by, and have met all the other requirements of, the rules of the Board of Supervising Inspectors, as shown by statement of the manufacturer of the tubes. Steam pressure for which boiler —— to be inspected, —— pounds. Style of boiler, ——. Boiler– to be installed upon the steamer ———.

Signature: ——— ———.

Subscribed and ——— to before me this —— day of ———, 192—.
(Sworn or affirmed.)

[NOTARY'S SEAL.]

——— ———,
*Notary Public.*

NOTE.—Inspectors will not accept this affidavit without the data required, unless accompanied by a satisfactory explanation in writing, to be filed with the affidavit.

(Sec. 4405, R. S.)

9. [Form 936.]

## AFFIDAVIT OF MANUFACTURER OF MARINE STEAM BOILERS.

DEPARTMENT OF COMMERCE,
STEAMBOAT INSPECTION SERVICE.

STATE OF ———, *County of* ———.

On this —— day of ———, A. D. 192—, personally appeared before me, ——— ———, a notary public in and for the county of ——— and State of ———, Mr. ——— ———, who deposes and says that he is ——— ———, of ——— ———, boiler manufacturer, and that the accompanying samples of ———, manufactured by ——— ———, of ——— ———, were cut from plates which are to be used in the construction of —— marine boiler– for ———, of ———, and no plate for shell or other

part of boiler subject to tensile strain of less tensile strength or quality than that determined by the United States inspector who made the tests, which lowest tensile strength found was ——— pounds, will be used in the construction of said boiler–, the dimensions of which will be: Length, ———; diameter, ———.

| | Material. | Number. | Length. | Thickness. | Diameter. |
|---|---|---|---|---|---|
| Tubes | | | | | |
| Flues | | | | | |
| Furnaces | | | | | |

Kind of furnaces, ——; round, ——; corrugated, ——; flat sides, ——. Thickness of plates of cylindrical shell of boiler, ——; thickness of side sheets in flat side of furnace, ——; thickness of flat top sheet of back connection, ——; thickness of plates of cylindrical shell of back connection, ——; thickness of material of boiler heads, ——; thickness of tube sheets, ——; thickness of plates of shell of steam chimney, ——; thickness of plates in lining of steam chimney, ——; thickness of side sheets, ——. Kind of rivets (iron or steel), ——; diameter of rivet holes, ——; pitch of rivets, ——. All rivet holes of boiler–, including steam and mud drums, will be fairly drilled and no part of such holes will be punched, ———; or punched, ———. All tubes used in the construction of said boiler - are of the thickness and material required by, and have met all the other requirements of, the rules of the Board of Supervising Inspectors, as shown by statement of the manufacturer of the tubes. Steam pressure for which boiler —— to be inspected, —— pounds. Style of boiler, ——. Boiler to be installed upon the steamer ———.

Signature: ——— ———.

Subscribed and ——— to before me this —— day of ———, 192—.
(Sworn or affirmed.)

[NOTARY'S SEAL.] ——— ———,
*Notary Public.*

NOTE.—Inspectors will not accept this affidavit unless the data required are given, unless accompanied by a satisfactory explanation in writing, to be filed with the affidavit.

Inspectors may make requisition on the Department for the necessary supply of blank affidavits for the use of boiler manufacturers. (Sec. 4405, R. S.)

FOREIGN-BUILT BOILERS.

10. Boilers of foreign-built vessels admitted to American registry shall be inspected in the same manner as boilers on American vessels.

The working steam pressure shall be determined by the application of the hydrostatic pressure in the ratio as required by the laws of the United States and by a close observation of the general condition of the boiler.

The working steam pressure under which the boilers are being operated shall be accepted as the basis for determining the allowable working pressure where it is not practicable or possible to secure a record of the tests of the plates entering into the construction of the boiler. (Sec. 4405, R. S.)

## RULE II.—BOILERS AND ATTACHMENTS.

DRAWINGS OF BOILERS.

1. The manufacturer of any boiler to be used for marine purposes shall furnish the inspectors of the district where such boiler or boilers are to be inspected duplicate blue prints or tracings fully descriptive of same in detail for their approval, one of which shall be kept on file in the office of the local inspectors and the other returned to the manu-

facturer. Where more than one boiler is made from a similar design, a drawing of which is on file in the local inspector's office, if made at a different date, a reference to such drawing on file is all that shall be required. The manufacturer shall also furnish the inspectors an affidavit on either Form 935 or 936, as contained in sections 8 and 9 of Rule I.

It shall be the duty of every local inspector of boilers to make, for every new boiler inspected in his district, all computations required by the rules and regulations, and any other necessary computations, from data obtained from blue prints or tracings, boiler manufacturers' affidavits, tensile test reports, and from other reliable sources. A record of such computations in full shall be made on letter sheets and filed with blue prints or tracings of boiler, the first sheet of such computations to be headed with a general description of boiler and with the vessel file number. (Secs. 4405, 4418, R. S.)

### CYLINDRICAL SHELLS.

2. The working steam pressure allowable on cylindrical shells of boilers constructed of plates inspected as required by these rules, when single riveted, shall not produce a strain to exceed one-sixth of the tensile strength of the iron or steel plates of which such boilers are constructed; but where the longitudinal laps of the cylindrical parts of such boilers are double riveted, and the rivet holes for such boilers have been fairly drilled instead of punched, an addition of 20 per cent to the working pressure provided for single riveting shall be allowed.

The pressure for any dimension of boilers shall be ascertained by the following rule, viz:

Multiply one-sixth of the lowest tensile strength found stamped on the plates in the cylindrical shell by the thickness—expressed in inches or part of an inch—and divide by the radius or half diameter, also expressed in inches, and the result will be the pressure allowable per square inch of surface for single riveting, to which add 20 per cent where the longitudinal laps of the cylindrical parts of such boiler are double riveted, when all the rivet holes of such boiler, including steam and mud drums, have been fairly drilled and no part of such holes has been punched. The pressure allowed shall be based on the plate whose tensile strength multiplied by its thickness gives the lowest product.

### GUIDE HOLES FOR DRILLS AND CUTTERS MAY BE PUNCHED.

Centers or guide holes not to exceed 75 per cent of the diameter of the full-sized finished hole for tubes and stays may be punched. The remainder shall be cleanly cut, drilled, or reamed to full size. Holes not to exceed 4 inches in diameter in plates five-eighths of an inch thick and under may be punched to within one-half inch of the full diameter of the finished hole; the remainder shall be cleanly cut, drilled, or reamed to full size. (Sec. 4433, R. S.)

## HEADS.

### REQUIREMENTS FOR HEADS.

3. All plates used as heads, when new and made to practically true circles, and as described below, shall be allowed a steam pressure in accordance with the following formula:

CONVEX HEADS.

$$P=\frac{T\times S}{R}$$

Where P = steam pressure allowable in pounds.
T = thickness of plate in inches.
S = one-fifth of the tensile strength.
R = one-half of the radius to which the head is bumped.

CONCAVE HEADS.

For concave heads the pressure allowable shall be eight-tenths times the pressure allowable for convex heads.

NOTE.—To find the radius of a sphere of which the bumped head forms a part, square the radius of head, divide this by the height of bump required; to the result add height of bump, which will equal diameter of sphere, one-half of which will be the required radius.

*Example.*

Required, the working pressure of a convex head of a 54-inch radius; material, 60,000 pounds tensile strength and one-half of an inch thick. Substituting values and solving, we have

$$P=\frac{0.5\times 12{,}000}{27}=222 \text{ pounds.}$$

The pressure allowable on a concave head of the same dimensions would be $222\times .8=177$ pounds.

To avoid grooving, the flanging shall be well rounded at the bend.

Bumped heads may contain a manhole opening flanged inwardly, when such flange is turned to a depth of three times the thickness of material in the head.

Material used in the construction of all bumped heads shall possess the physical and chemical qualities prescribed by the Board of Supervising Inspectors for all plates subject to tensile strain, as required by section 4430, Revised Statutes.

FLAT HEADS OF WROUGHT-IRON OR STEEL PLATE.

Where flat heads do not exceed 20 inches in diameter they may be used without being stayed, and the steam pressure allowable shall be determined by the following formula:

$$P=\frac{C\times T^2}{A}$$

Where P = steam pressure allowable in pounds.
T = thickness of material in sixteenths of an inch.
A = one-half the area of head in inches.
C = 112 for plates seven-sixteenths of an inch and under.
C = 120 for plates over seven-sixteenths of an inch.

*Provided,* The flanges are made to an inside radius of at least $1\frac{1}{2}$ inches.

*Example.*

Required, the working pressure of a flat head 20 inches in diameter and three-fourths of an inch thick. Substituting values, we have

$$P=\frac{120\times 144}{157}=110 \text{ pounds.}$$

(Sec. 4418, R. S.)

### MANHOLES, HANDHOLES, AND HOLES FOR PIPE CONNECTIONS.

4. All boilers built on and after August 1, 1914, shall have a manhole opening above the flues or tubes of not less than 10 by 16 inches, 11 by 15 inches, or of an equal area, in the clear, and shall have such other manhole openings in other parts of the boiler as may be required by local inspectors when considering blue prints or tracings submitted to them for approval, of sufficient dimensions to allow easy access to the interior of the boiler for the purpose of inspection and examination.

When holes exceeding 6 inches in diameter are cut in boilers for pipe connections, manhole and handhole plates, such holes shall be reinforced, either on the inside or outside of boiler, with reinforcing wrought-iron or steel rings, which shall be securely riveted or properly fastened to the boiler, such reinforcing material to be rings of sufficient width and thickness of material to fully compensate for the amount of material cut from such boilers, in flat surfaces; and where such opening is made in the circumferential plates of such boilers, the reinforcing ring shall have a sectional area equal to at least one-half of the sectional area of the opening parallel with the longitudinal seams of such portion of the boiler. On boilers carrying 75 pounds or less steam pressure a cast-iron stop valve, properly flanged, may be used as a reinforcement to such opening. When holes are cut in any flat surface of such boilers and such holes are flanged inwardly to a depth of not less than 1½ inches, measuring from the outer surface, the reinforcement rings may be dispensed with.

When reinforcing rings as described above are made of wrought iron or steel, the material shall not be required to be tested.

Seamless forged steel nozzles may be used for reinforcing holes cut in boilers when the amount of material in the flange of the saddle that is secured to the boiler is equal to the amount of material removed from the boiler.

No connection between shell of boiler and mud drum shall exceed 9 inches in diameter, and the flange of the mud-drum leg shall consist of an equal amount of material to that cut out of the shell of boiler. (Sec. 4418, R. S.)

### DONKEY BOILERS.

5. Donkey boilers shall be inspected in the same manner as the main boilers. (Sec. 4418, R. S.)

### DRILLING TO DETERMINE THICKNESS.

6. The shell of any boiler which has reached the age of 10 years shall, at the first annual inspection thereafter, and at such subsequent periods as the local or supervising inspectors may deem necessary, be drilled near the water line and at such other points in the shell as may be necessary to determine as nearly as possible the thickness of material, which ascertained thickness, together with the general condition of the boiler, shall govern the steam pressure allowed. (Secs. 4418, 4430, R. S.)

### HYDROSTATIC PRESSURE.

7. The hydrostatic pressure applied shall be in the proportion of 150 pounds to the square inch to 100 pounds to the square inch of the steam pressure allowed, and the inspector, after applying the hydrostatic test, shall thoroughly examine every part of the boiler. The hydrostatic pressure shall also be applied to the main steam pipe up to the throttle.

In the application of the hydrostatic pressure to boilers, inspectors shall require such arrangements as will guard against main and auxiliary stop valves being subjected to hydrostatic pressure on one side at the same time that steam pressure is exerted on the opposite side.

Steamers on going out of service or laying up in winter quarters and beginning the annual inspection may have the hydrostatic pressure applied to boilers at any time preceding the date of the final completion of the inspection, so that, however, in no instance shall the vessel be navigated to exceed 12 months without the application of the hydrostatic pressure. (Sec. 4418, R. S.)

### STEAM CHIMNEYS.

8. When steam chimneys constructed of flues subject to external pressure have a thickness of not less than seven-sixteenths of an inch, and the flue is heated only with the waste gases, and the temperature does not exceed 600° F., the working pressure shall be determined by the rules for plain furnaces or flues, corrugated furnaces, and Adamson type. When flues are strengthened with tee irons, angle irons, or bowling rings, the working pressure shall be determined by formula for plain furnace flues. When angle or tee bars are used, they shall have a thickness of leaf of at least two-thirds that of plate and a depth of at least one-fourth of pitch. Said tee bars shall be substantially riveted to flue. All rivet holes in tees shall be drilled, holes shall be staggered, distance from center of rivet holes to edge of tees shall be not less than 1.5 times diameter of rivet holes, and percentage of plate section shall be not less than rivet section. Bowling rings may be used, as they increase the strength and provide for expansion of flue. For all boilers carrying a steam pressure of over 60 pounds and not over 100 pounds per square inch the flue may be braced with socket bolts in lieu of tee rings. Such bolts shall have heads and the ends shall be threaded for nuts, with plate washers or equivalent on the inside of flue. Pitch of stays and bolts and the maximum stress in pounds allowable per square inch of cross-sectional area for stays and bolts shall be determined by section 16, Rule II.

If a greater working stress is desired on flues than that permitted by the formula for flues strengthened with bowling rings or tee irons, the flue may be braced to shell and may be deemed a flat surface, and shall be stayed in strict accordance with the rules for stays.

Drainpipes shall be fitted to steam chimneys in which water is liable to collect. Steam chimneys that are arranged to be disconnected from main boiler shall be provided with a safety valve not less than 3 inches in diameter and with a steam gauge, and shall be provided with manholes to enable inspectors to examine every portion of the interior. (Sec. 4418, R. S.)

RIVETED JOINTS.

9. The diameter of rivets, rivet holes, distance between centers of rivets, and distance from centers of rivets to edge of lap for different thicknesses of plates for single and double riveting shall be determined by the following rules.

The following formulas, equivalent to those of the British Board of Trade, are given for the determination of the pitch, distance between rows of rivets, diagonal pitch, maximum pitch, and distance from centers of rivets to edge of lap of single and double riveted lap joints for both iron and steel boilers:

Let p = greatest pitch of rivets in inches.
n = number of rivets in one pitch.
$p_d$ = diagonal pitch in inches.
d = diameter of rivets in inches.
T = thickness of plate in inches.
V = distance between rows of rivets in inches.
E = distance from edge of plate to center of rivet in inches.

TO DETERMINE THE PITCH.

*Iron* plates and iron rivets:

$$p = \frac{d^2 \times 0.7854 \times n}{T} + d.$$

Example, first, for single-riveted joint: Given, thickness of plate (T) = $\frac{1}{2}$ inch, diameter of rivet (d) = $\frac{7}{8}$ inch. In this case n = 1. Required the pitch.

Substituting in formula, and performing operation indicated,

$$\text{Pitch} = \frac{(\frac{7}{8})^2 \times 0.7854 \times 1}{\frac{1}{2}} + \frac{7}{8} = 2.077 \text{ inches.}$$

Example for double-riveted joint: Given, t = $\frac{1}{2}$ inch and d = $\frac{13}{16}$ inch. In this case n = 2. Then—

$$\text{Pitch} = \frac{(\frac{13}{16})^2 \times 0.7854 \times 2}{\frac{1}{2}} + \frac{13}{16} = 2.886 \text{ inches.}$$

For *steel* plates and steel rivets:

$$p = \frac{23 \times d^2 \times 0.7854 \times n}{28 \times T} + d.$$

Example for single-riveted joint: Given, thickness of plate = $\frac{1}{2}$ inch diameter of rivet = $\frac{15}{16}$ inch. In this case n = 1.

$$\text{Pitch} = \frac{23 \times (\frac{15}{16})^2 \times 0.7854 \times 1}{28 \times \frac{1}{2}} + \frac{15}{16} = 2.071 \text{ inches.}$$

Example for double-riveted joint: Given, thickness of plate = $\frac{1}{2}$ inch diameter of rivet = $\frac{7}{8}$ inch. n = 2. Then—

$$\text{Pitch} = \frac{23 \times (\frac{7}{8})^2 \times 0.7854 \times 2}{28 \times \frac{1}{2}} + \frac{7}{8} = 2.85 \text{ inches.}$$

FOR DISTANCE FROM CENTER OF RIVET TO EDGE OF LAP.

$$E = \frac{3 \times d}{2}.$$

Example: Given, diameter of rivet (d) = $\frac{7}{8}$ inch; required the distance from center of rivet to edge of plate.

$$E = \frac{3 \times \frac{7}{8}}{2} = 1.312 \text{ inches, for single or double riveted lap joint.}$$

FOR DISTANCE BETWEEN ROWS OF RIVETS.

The distance between lines of centers of rows of rivets for double, chain-riveted joints (V) shall not be less than twice the diameter of rivet, but it is more desirable that V should not be less than $\frac{4d+1}{2}$.

Example under latter formula: Given, diameter of rivet = $\frac{7}{8}$ inch. Then—

$$V = \frac{(4 \times \frac{7}{8}) + 1}{2} = 2.25 \text{ inches.}$$

For ordinary, double, zigzag riveted joints:

$$V = \frac{\sqrt{(11p + 4d) \quad (p + 4d)}}{10}.$$

Example: Given, pitch = 2.85 inches, and diameter of rivet = $\frac{7}{8}$ inch. Then—

$$V = \frac{\sqrt{(11 \times 2.85 + 4 \times \frac{7}{8}) \quad (2.85 + 4 \times \frac{7}{8})}}{10} = 1.487 \text{ inches.}$$

DIAGONAL PITCH.

For double, zigzag riveted lap joint. Iron and steel:

$$p_d = \frac{6p + 4d}{10}$$

Example: Given, pitch = 2.85 inches, and d = $\frac{7}{8}$ inch. Then—

$$p_d = \frac{(6 \times 2.85) + (4 \times \frac{7}{8})}{10} = 2.06 \text{ inches.}$$

MAXIMUM PITCHES FOR RIVETED LAP JOINTS.

For single-riveted lap joints:

$$\text{Maximum pitch} = (1.31 \times T) + 1\tfrac{5}{8}.$$

For double-riveted lap joints:

$$\text{Maximum pitch} = (2.62 \times T) + 1\tfrac{5}{8}.$$

Example: Given, a thickness of plate = $\frac{1}{2}$ inch, required the maximum pitch allowable.

For single-riveted lap joint:

$$\text{Maximum pitch} = (1.31 \times \tfrac{1}{2}) + 1\tfrac{5}{8} = 2.28 \text{ inches.}$$

For double-riveted lap joint:

$$\text{Maximum pitch} = (2.62 \times \tfrac{1}{2}) + 1\tfrac{5}{8} = 2.935 \text{ inches.}$$

To determine the pitch of rivets from the above formulas, use the diameter and area of the rivet holes. The diameter of the rivets is the diameter of the driven rivet.

Any riveted joint shall be allowed when it is constructed so as to give an equal percentage of strength to that obtained by the use of the formula given. (Secs. 4418, 4433, R. S.)

### BUTT STRAPS.

10. Where butt straps are used in the construction of marine boilers, the straps for single butt strapping shall in no case be less than the thickness of the shell plates; and where double butt straps are used, the thickness of each shall in no case be less than five-eighths the thickness of the shell plates. (Sec. 4418, R. S.)

### WOODWORK FROM BOILERS.

11. *Externally heated boilers* shall have a clear space between the boiler and the woodwork of not less than 6 inches at the sides and 4 inches at the top.

*Internally heated boilers* shall have a clear space between the boiler and the woodwork of not less than 4 inches at the sides and 4 inches at the top.

All woodwork or other ignitible substance approaching within 12 inches of the boiler or smokestack (unless such boiler or smokestack is covered with good nonconducting material) shall be suitably sheathed with metal over noncombustible material, and it shall be the duty of the inspectors to see that all woodwork or other ignitible substance in or around the fireroom is properly protected by metal or asbestos sheathing.

All boilers hereafter placed in wooden steamers shall have a clear space of at least 8 inches between the underside of the cylindrical shell and the floor or keelson; and on all other steamers the boilers shall be so placed as to permit of proper inspection of the underside thereof.

All water-tube or coil boilers shall have a clear space of not less than 4 inches between the back end of boiler and bulkhead. All other boilers shall have a clear space of not less than 2 feet between the back end of boiler and bulkhead. (Secs. 4418, 4470, R. S.)

### ANGLE STIFFENERS FOR CURVED SURFACES.

12. Where rounded bottoms of combustion chambers are stiffened with single angle-iron stiffeners, such angles shall have a thickness of leaf eight-tenths that of the plate and a depth of at least one-half pitch. Where stiffened with double angle irons or tee bars, such

angles or tee bars shall have a thickness of leaf at least two-thirds that of plate and a depth of at least one-fourth of pitch. Said angles or tee bars shall be substantially riveted to the plate supported. Where the bottoms of combustion chambers are strengthened by angles or tee irons, the same shall be on the water side of the combustion chambers, as shown in the sketches on pages 15–19.

Where rounded tops of combustion chambers are stiffened with single or double angle-iron stiffeners or tee bars, such angles or tee bars shall be of thickness and depth of leaf not less than specified for rounded bottoms of combustion chambers. Said angles or tee bars shall be supported on thimbles and riveted through with rivets not less than 1 inch in diameter and spaced not to exceed 6 inches between centers.

Working pressure allowed on rounded surfaces supported by angle irons or tee bars shall be determined by the following formula:

$$\text{Working pressure} = \frac{900 \times T^2}{P \times D}$$

Where T = thickness of plate in sixteenths of an inch.
P = pitch of angle or tee stiffeners, in inches.
D = diameter of curve to which plate is bent, in inches.

*Example.*

Given $T = \frac{9}{16}$ of an inch. P = 7 inches. D = 51 inches.
Substituting values in formula and solving,

$$\text{Working pressure} = \frac{900 \times 81}{7 \times 51} = 204 \text{ pounds per square inch.}$$

PRESSURE PERMISSIBLE ON ROUNDED BOTTOM OF COMBUSTION CHAMBERS, ANGLES BEING OMITTED, AND TUBE SHEETS.

$$P = \frac{50\ (300T - 2L)}{D}$$

Where P = working pressure in pounds.
T = thickness of bottom plate of combustion chamber, in inches.
L = extreme length of plate forming bottom of combustion chamber, in inches.
D = twice outside radius of bottom of combustion chamber, in inches.

Required working pressure on bottom plate of a combustion chamber, angles being omitted: Thickness of plate, 0.82 of an inch; extreme length of plate, 33 inches; twice the radius of bottom of combustion chamber, 50 inches. Substituting and solving:

$$P = \frac{50 \times (300 \times 0.82 - 2 \times 33)}{50} = 180 \text{ pounds.}$$

$$T = \frac{P \times D + 100L}{15{,}000}$$

Pressure allowable on tube sheets where combustion chambers are not suspended from the shell of the boiler shall be determined by the following formula:

$$P = \frac{(D - d)\ T \times 27{,}000}{W \times D}$$

Where P = working pressure in pounds.
D = least horizontal distance between tube centers in inches.
d = inside diameter of tubes in inches.
T = thickness of tube plate in inches.
W = extreme width of combustion chamber in inches.

Required the working pressure of a tube sheet supporting a crown sheet braced by crown bars. Horizontal distance between centers, $4\frac{1}{8}$ inches; inside diameter of tubes, 2.782 inches; thickness of tube sheets, eleven-sixteenths of an inch; extreme width of combustion chamber, $34\frac{1}{4}$ inches, measured from outside of tube plate to outside of back plate; material, steel. Substituting and solving

$$P = \frac{(4.125 - 2.782) \times 0.6875 \times 27{,}000}{34.25 \times 4.125} = 176 \text{ pounds pressure.}$$

The compressive stress on tube plates, as determined by the following formula, shall not exceed 13,500 pounds per square inch when pressure on top of combustion chamber is supported by vertical plates of such chamber.

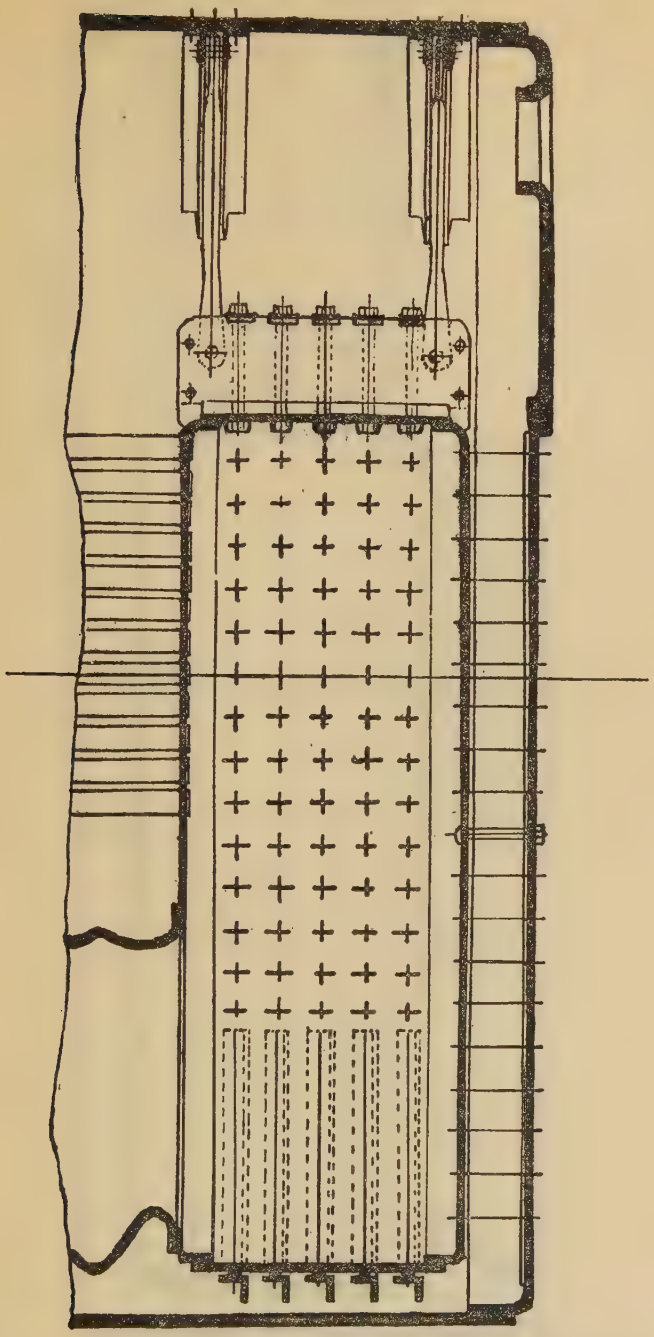
$$C = \frac{P \times D \times W}{2\ (D - d)\ T}$$

Where C = stress on tube sheet.
P = working pressure in pounds.
D = least horizontal distance between tube centers in inches.
d = inside diameter of tube in inches.
W = extreme width of combustion chamber in inches.
T = thickness of tube sheet in inches.

Sling stays may be used in lieu of girders in all cases; provided, however, that when such sling stays are used, girders or screw stays of the same sectional area shall be used for securing the bottom of combustion chamber to the boiler shell.

When girders are dispensed with and the top and bottom of combustion chambers are secured by sling stays or braces, the sectional area of such stays shall conform with the requirements of section 16, Rule II.

The following drawings show an excellent practice of constructing combustion chambers with and without sling stays:

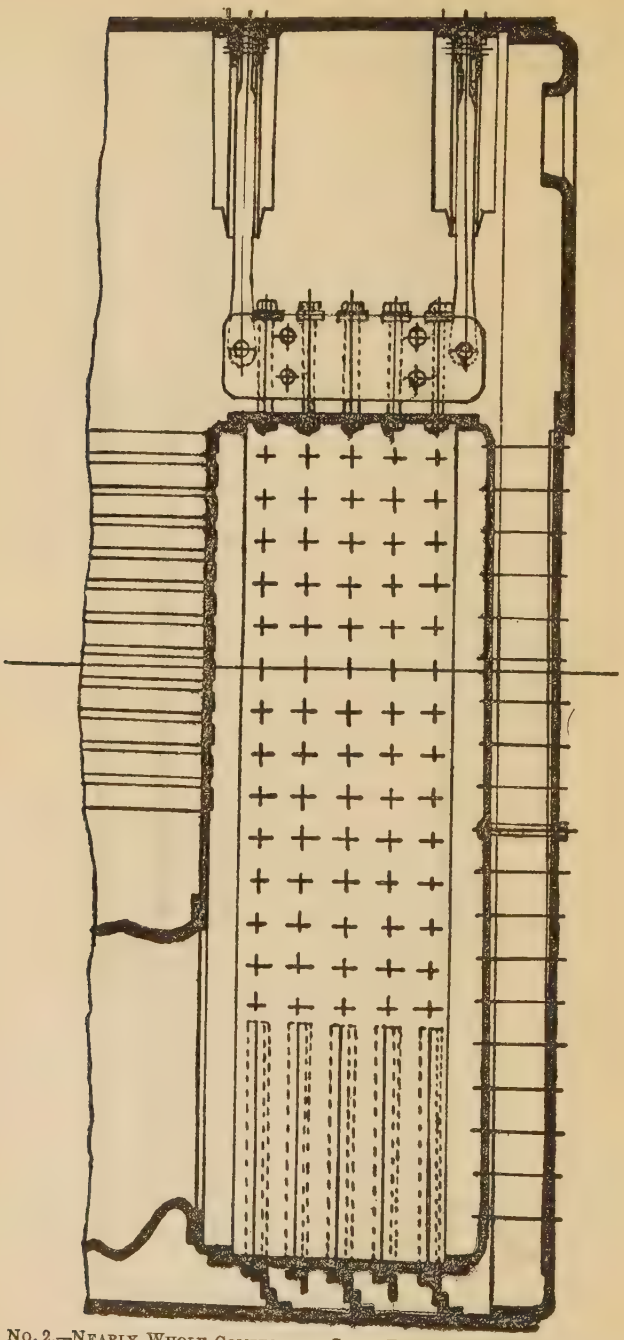


No. 1.—Full Load on Tube Sheet and Back Plate.

Diameter of hangers should be sufficient to carry the weight of combustion chamber and one-half the tubes and furnaces when no water is in boiler. No effect of buoyancy is considered.

These remarks are for separate combustion chambers when they are not secured to the shell at the bottom and therefore liable to bend the small screw stays.

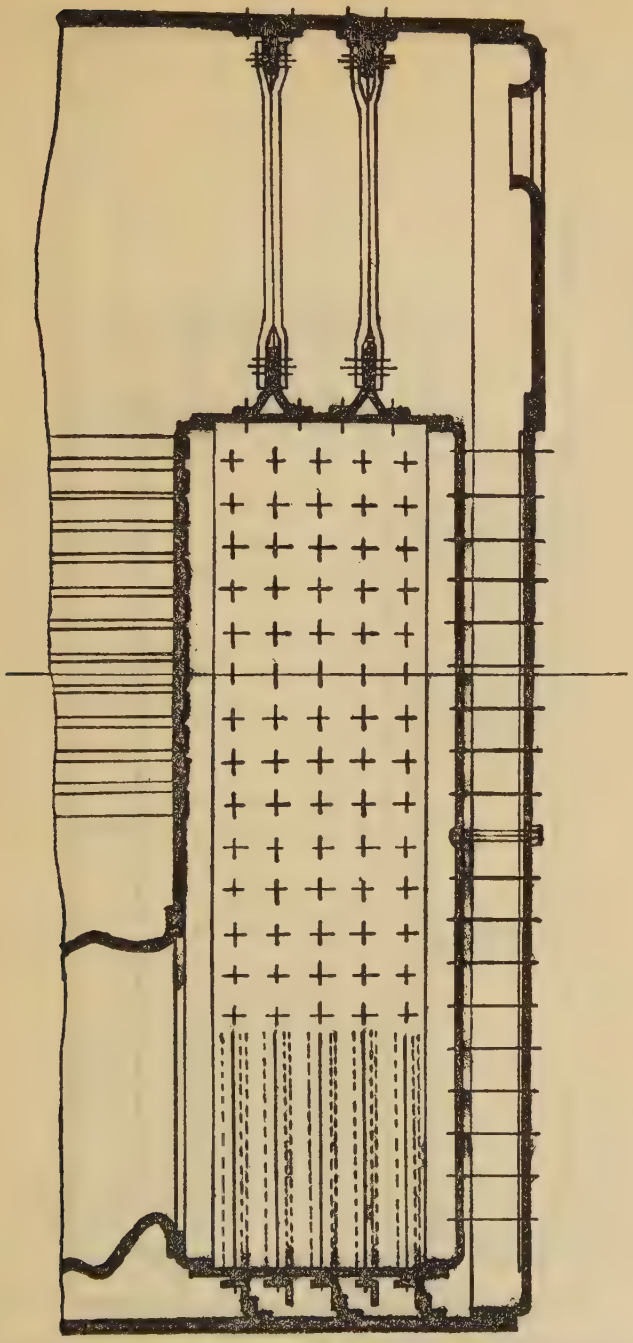
In this case the tube sheet and back plate get the full compressive load in a similar manner to a boiler without hanging stays.



No. 2.—Nearly Whole Compressive Load Taken off Tube Sheet.

Top hanging stays take full compressive load off tube sheet and back plate, except that half the load on unsupported portions marked B beyond stays will be taken by the tube sheet and back plate, respectively, and the other half by the last stays.

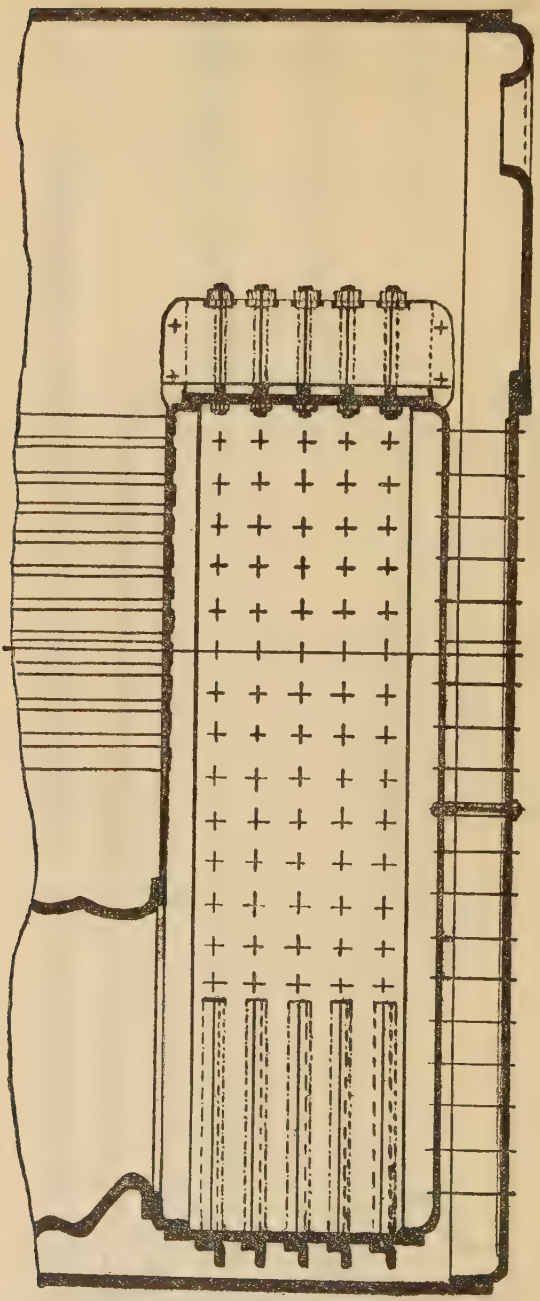
The thickness of tube sheet and back plate may be materially reduced from what would be required when tube sheet and back plate take full compressive load, providing that combustion chamber is well stayed to take full load at the bottom by screw stays or girders of plates and angles.



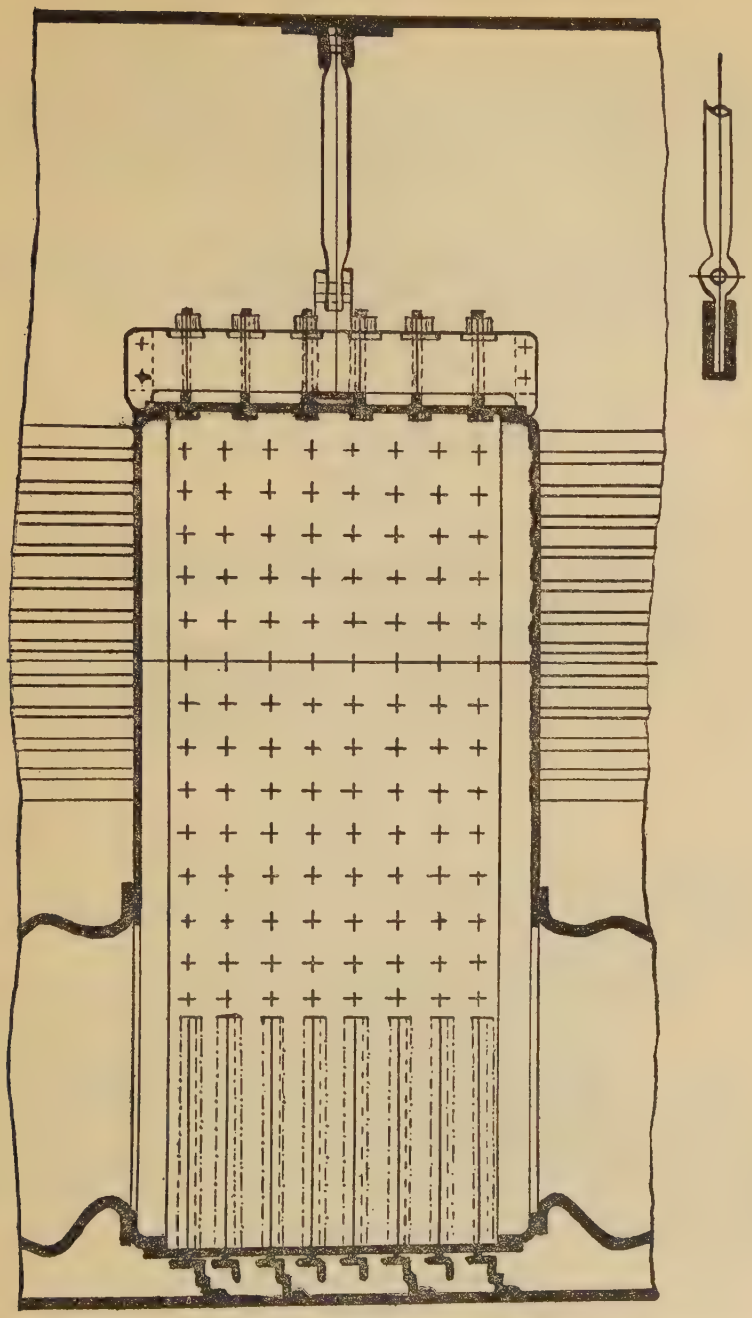
No. 3.—Nearly Whole Compressive Load Taken off Tube Sheet.

Top hanging stays take full compressive load off tube sheet and back plate, except that half the load on unsupported portions marked B beyond stays will be taken by the tube sheet and back plate, respectively, and the other half by the last stays.

The bottom stays, whether of screw stays or girders of plates and angles, must be of the same sectional area as the top braces, and no boiler should be built having top stays as shown without having the bottom stays of equal strength.



No. 4.—Tube Sheet and Back Plate Get Full Load, and Therefore Should be Heavy Enough to Withstand Such.



No. 5.—Tube Sheets Each Take Part of Compressive Load, the Hanging Stays Taking Care of the Other Part.

The bottom stays, whether of screw stays or girders of plates and angles, must be of the same sectional area as the top braces.

In this case the thickness of the tube sheets may be materially reduced from what would be required when tube sheets together take full compressive load. (Sec. 4418, R. S.)

FURNACES.

13. The tensile strength of steel used in the construction of corrugated or ribbed furnaces shall not exceed 67,000 and be not less than 54,000 pounds; and in all other furnaces the minimum tensile strength shall be not less than 58,000 and the maximum not more than 67,000 pounds. The minimum elongation in 8 inches shall be 20 per cent.

All corrugated furnaces having plain parts at the ends not exceeding 9 inches in length (except flues especially provided for), when new, and made to practically true circles, shall be allowed a steam pressure in accordance with the following formula:

$$P = \frac{C \times T}{D}.$$

LEEDS SUSPENSION BULB FURNACE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths of an inch.
D = mean diameter in inches.
C = 17,300, a constant, determined from an actual destructive test under the supervision of the board, when corrugations are not more than 8 inches from center to center and not less than 2¼ inches deep.

MORISON CORRUGATED TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths of an inch.
D = mean diameter in inches.
C = 15,600, a constant, determined from an actual destructive test under the supervision of the Board of Supervising Inspectors, when corrugations are not more than 8 inches from center to center and the radius of the outer corrugations is not more than one-half of the suspension curve.

[In calculating the mean diameter of the Morison furnace, the least inside diameter plus 2 inches may be taken as the mean diameter, thus—

Mean diameter = least inside diameter + 2 inches.]

DEIGHTON CORRUGATED TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths of an inch.

Where D = mean diameter in inches.
C = 15,600, a constant, when corrugations are not more than 8 inches from center to center and not less than $1\frac{1}{2}$ inches deep.

FOX TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths.
D = mean diameter in inches.
C = 14,000, a constant, when corrugations are not more than 8 inches from center to center and not less than $1\frac{1}{2}$ inches deep.

PURVES TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than seven-sixteenths.
D = least outside diameter in inches.
C = 14,000, a constant, when rib projections are not more than 9 inches from center to center and not less than $1\frac{3}{8}$ inches deep.

BROWN TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths.
D = least outside diameter in inches.
C = 14,000, a constant (ascertained by an actual destructive test under the supervision of this board), when corrugations are not more than 9 inches from center to center and not less than $1\frac{5}{8}$ inches deep.

PLUG FOR CORRUGATED AND RIBBED FURNACES.

The thickness of corrugated and ribbed furnaces shall be ascertained by actual measurement. The manufacturer shall have said furnaces drilled for a $\frac{3}{8}$-inch pipe tap and fitted with a screw plug that can be removed by the inspector when taking this measurement. For the Brown and Purves furnaces the holes shall be in the center of the second flat; for the Morison, Fox, and other similar types, in the center of the top corrugation, at least as far in as the fourth corrugation from the end of the furnace.

TYPE HAVING SECTIONS 18 INCHES LONG

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than seven-sixteenths.

Where D = mean diameter in inches.
C = 10,000, a constant, when corrugated by sections not more than 18 inches from center to center and not less than 2½ inches deep, measuring from the least inside to the greatest outside diameter of the corrugations and having the ends fitted one into the other and substantially riveted together, provided that the plain parts at the ends do not exceed 12 inches in length.

ADAMSON TYPE.

When plain horizontal flues are made in sections not less than 18 inches in length, and not less than five-sixteenths of an inch thick, and flanged to a depth of not less than three times the diameter of rivet holes plus the radius at furnace wall (inside diameter of furnace), the thickness of the flanges shall be as near the thickness of the body of the plate as practicable.

The radii of the flanges on the fire side shall be not less than three times the thickness of plate.

The distance from the edge of the rivet hole to the edge of the flange shall be not less than the diameter of the rivet hole, and the diameter of the rivets before driven shall be at least one-fourth inch larger than the thickness of the plate.

The depth of the ring between the flanges shall be not less than three times the diameter of the rivet holes, and the ring shall be substantially riveted to the flanges. The fire edge of the ring shall terminate at or about the point of tangency to the curve of the flange, and the thickness of the ring shall be not less than one-half inch.

The pressure allowed shall be determined by the following formula:

ADAMSON FURNACES IN SECTIONS OF NOT LESS THAN 18 INCHES IN LENGTH.

$$P=\frac{57.6}{D}\left[(18.75\times T)-(1.03\times L)\right]$$

Where P = working pressure in pounds per square inch.
D = outside diameter of furnace in inches.
L = length of section in inches.
T = thickness of plate in sixteenths of an inch.

*Example.*

Given a furnace 44 inches in diameter, 48 inches in length, and one-half of an inch thick. Substituting values in formula, we have

$$P=\frac{57.6}{44}\left[(18.75\times 8)-(1.03\times 48)\right]=$$

$$1.309\ (150-49.44)=131\ \text{pounds.}$$

SPHERICAL-TOP FURNACES.

Thickness and working pressure of furnaces of 20 inches in diameter and over, when tops are portions of spheres and made in one plate, shall be determined by the following formula:

$$T=\frac{P\times R}{10,000}+0.12.$$

Where P = working pressure in pounds.
T = thickness of plate in inches when constructed of one plate.
R = radius of curvature in inches.
% = efficiency per cent of riveted joint when end of furnace is constructed of more than one plate, the thickness will be % T.

*Example.*

Required the thickness of a spherical convex furnace made in one sheet. Working pressure, 125 pounds per square inch; radius of curvature, 34 inches. Substituting values,

$$T=\frac{125\times 34}{10{,}000}+0.12=0.545.$$

If the end of the furnace is constructed of more than one plate and efficiency per cent of riveted joint is 75,

$$T=\frac{0.545}{0.75}=0.72 \text{ of an inch.}$$

Solving for P, we have

$$P=\frac{(T-0.12)\times 10{,}000}{R}.$$

Required the working pressure when end of furnace is constructed of a single plate. Thickness, 0.545 of an inch; radius of curvature, 34 inches. Substituting values and solving,

$$P=\frac{(0.545-0.12)\times 10{,}000}{34}=125 \text{ pounds.}$$

PLAIN CIRCULAR RIVETED FLUES, FURNACES, AND CONE TOPS MADE IN SECTIONS OF NOT LESS THAN 18 INCHES IN LENGTH AND NOT LESS THAN FIVE-SIXTEENTHS OF AN INCH THICK.

Cylindrical riveted flues and furnaces made in sections of not less than 18 inches in length fitted one into the other and substantially riveted, combustion chambers for vertical submerged tubular boilers in the shape of a frustum of a cone, constructed to a practically true circle, shall be allowed a steam pressure according to the following formula:

$$P=\frac{51.5}{D}\left[(18.75\times T)-(1.03\times L)\right]$$

Where P = working pressure in pounds per square inch.
D = outside diameter of furnaces in inches, or outside *mean* diameter of cone top in inches.
L = length of section or flue in inches.
T = thickness of furnace or cone top in sixteenths of an inch, not to be less than five-sixteenths of an inch.

When diameter of plain furnaces and flues used in vertical type of boilers or mean diameter of cone tops exceeds 42 inches, they shall be deemed a flat surface and must be stayed in accordance with rules governing flat surfaces. If a greater working pressure than given by formula is desired for mean diameters under 42 inches, the flues or cone tops shall be substantially stayed for such additional pressure.

*Example.*

Given a furnace 26 inches in diameter, 28 inches in height, and five-sixteenths of an inch thick. A steam pressure of 175 pounds is desired.

Substituting values in formula,

$$P = \frac{51.5}{26}\left[(18.75 \times 5) - (1.03 \times 28)\right] = 128 \text{ pounds.}$$

175 − 128.5, an excess of 46.5 pounds, therefore furnace shall be braced.

Substituting 46.5 for working pressure, W. P. in formula.

Working pressure, W. P. $= \frac{C \times T^2}{P^2}$.

Solving for $P^2$,

$$P^2 = \frac{112 \times 5^2}{46.5},$$

$$P = \sqrt{60.21} = 7.7.$$

Pitch of $7.7 \times 7.7 = 59.29$ area.

To determine size of stay bolt. Area multiplied by pressure per square inch equals total stress on stay. Thus, $59.29 \times 46.5 = 2{,}756.985$ pounds pressure on the plate. Thus, 2,756.985 divided by 6,000 = 0.4594 area of stay bolt, practically a thirteen-sixteenths of an inch stay bolt taken at root of thread. (Sec. 4418, R. S.)

## FLUES.

### PLAIN, LAPWELDED STEEL FLUES, 7 TO 18 INCHES DIAMETER.

14. Working pressures and corresponding minimum thicknesses of wall for long, plain, lapwelded, and seamless steel flues, 7 to 18 inches diameter, subjected to external pressure only, shall be determined by the following table and formula:

| Outside diameter of flue. | Working pressure in pounds per square inch. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 100 | 120 | 140 | 160 | 180 | 200 | 220 |
| | Thickness of flue in inches. Safety factor, 5. | | | | | | |
| *Inches.* | | | | | | | |
| 7 | 0.152 | 0.160 | 0.168 | 0.177 | 0.185 | 0.193 | 0.201 |
| 8 | .174 | .183 | .193 | .202 | .211 | .220 | .229 |
| 9 | .196 | .206 | .217 | .227 | .237 | .248 | .258 |
| 10 | .218 | .229 | .241 | .252 | .264 | .275 | .287 |
| 11 | .239 | .252 | .265 | .277 | .290 | .303 | .316 |
| 12 | .261 | .275 | .289 | .303 | .317 | .330 | .344 |
| 13 | .283 | .298 | .313 | .328 | .343 | .358 | .373 |
| 14 | .301 | .320 | .337 | .353 | .369 | .385 | .402 |
| 15 | .323 | .343 | .361 | .378 | .396 | .413 | .430 |
| 16 | .344 | .366 | .385 | .404 | .422 | .440 | .459 |
| 17 | .366 | .389 | .409 | .429 | .448 | .468 | .488 |
| 18 | .387 | .412 | .433 | .454 | .475 | .496 | .516 |

Thicknesses in this table were calculated by formula:

$$T = \frac{[(F \times P) + 1{,}386]D}{86{,}670}$$

Where D = outside diameter of flue in inches.
T = thickness of wall in inches.
P = working pressure in pounds per square inch.
F = factor of safety.

This formula is applicable to lengths greater than six diameters of flue, to working pressures greater than 100 pounds, to outside diameters of from 7 to 18 inches, and to temperatures less than 650° F.

*Example.*

Required the thickness of a flue 10 inches in diameter; working pressure, in pounds per square inch, 200; factor of safety, 5. Substituting and solving:

$$T = \frac{[(5 \times 200) + 1{,}386]10}{86{,}670} = 0.275 \text{ of an inch.}$$

To determine working pressure, diameter and thickness being given:

$$P = \frac{(T \times 86{,}670) - (1{,}386 \times D)}{D \times F}$$

Where D = outside diameter of flue in inches.
T = thickness of wall in inches.
P = working pressure in pounds per square inch.
F = factor of safety.

*Example.*

Required the working pressure of a flue 12 inches outside diameter, 0.375 of an inch thick; factor of safety is 5.
Substituting and solving:

$$P = \frac{(0.375 \times 86{,}670) - (1{,}386 \times 12)}{12 \times 5} = 264.4 \text{ pounds pressure.}$$

WORKING PRESSURE ALLOWABLE ON RIVETED FLUES OVER 6 AND NOT OVER 18 INCHES IN DIAMETER, MADE IN SECTIONS, AND SUBJECTED TO EXTERNAL PRESSURE ONLY.

When flues are constructed of plates made in sections and efficiently riveted together, not less than 24 inches in length, minimum thickness, 0.25 of an inch, over 6 and not exceeding 18 inches in diameter, the working pressure shall be determined by the following formula:

$$P = \frac{8{,}100 \times T}{D}$$

Where P = working pressure in pounds per square inch.
T = thickness in inches.
D = outside diameter in inches.

*Example.*

Required the working pressure of a flue 13 inches outside diameter, 0.33 of an inch thick.

Substituting values and solving:

$$P = \frac{8{,}100 \times 0.33}{13} = 205 \text{ pounds.}$$

WORKING PRESSURE ALLOWABLE ON RIVETED, SEAMLESS, OR LAPWELDED FLUES OVER 18 AND NOT OVER 28 INCHES IN DIAMETER, MADE IN SECTIONS, AND SUBJECTED TO EXTERNAL PRESSURE ONLY.

The working pressure allowable on riveted, seamless, or lapwelded flues over 18 inches in diameter up to and including 28 inches in diameter, made in sections not less than 24 inches in length, efficiently riveted together, sections not to exceed 3½ times the diameter of the flue, when subjected to external pressure only, shall be determined by the following formula:

$$P = \frac{51.5}{D}[(18.75 \times T) - (L \times 1.03)]$$

Where P = working pressure in pounds per square inch.
D = outside diameter of flue in inches.
L = length of flue in inches, not to exceed 3½ diameters of flue.
T = thickness of wall in sixteenths of an inch.

*Example.*

Required the working pressure of a flue 19 inches outside diameter, 0.4375 of an inch thick, length 66 inches.

Substituting values and solving:

$$P = \frac{51.5}{19}[(18.75 \times 7) - (66 \times 1.03)] = 171 \text{ pounds pressure.}$$

When lapwelded or seamless flues over 5 inches in diameter are used in externally fired boilers over 20 feet in length, they may be allowed to be made in two pieces: (1) joined together by a standard screw-pipe coupling or sleeve; (2) by swelling the end of one section of the flue sufficiently to permit it to lap over the other section not less than 4 inches and be double riveted; or (3) by butting the two sections of the flue together and fitting a band or butt strap not less than 8 inches in length equally divided over the joint of the two sections, and of a thickness not less than the thickness of the flue, and double riveted to each section. When any of the above methods are used on more than one flue in a boiler, the couplings or sleeves shall not be allowed to come opposite, and the distance measured between any such flues and between any such flues and the shell shall be made by measuring between the plates in the flues and the plates in the shell. It shall be the duty of the inspectors to see that the flues are well screwed into the couplings or sleeves so as to have the ends of flues as near together as is practicable.

Inspectors are required at each annual inspection to carefully inspect the flues of every boiler and subject them to the hammer test where possible or practicable in order that deterioration of material may be detected. If such test indicates thin material, the

doubtful place shall be drilled and the material carefully gauged in order that the safe pressure may be determined; or if the flue is found to deviate from the form of a practically true circle, the pressure shall be reduced accordingly. The efficiency and workmanship of the riveted seams shall also be carefully observed at all inspections. (Sec. 4418, R. S.)

TUBES.

15. Lapwelded and seamless tubes, used in boilers whose construction was commenced after June 30, 1910, having a thickness of material according to their respective diameters, shall be allowed a working pressure as prescribed in the following table, provided they are deemed safe by the inspectors. Where heavier material is used, pressure may be allowed as prescribed in first formula under the heading "Flues," for determining the working pressure of lapwelded flues. Any length of tube is allowable.

| Outside diameter. | Thickness of material. | Maximum pressure allowed. |
|---|---|---|
| *Inches.* | *Inch.* | *Pounds.* |
| 2 | 0.095 | 427 |
| 2¼ | .095 | 380 |
| 2½ | .109 | 392 |
| 2¾ | .109 | 356 |
| 3 | .109 | 327 |
| 3¼ | .120 | 332 |
| 3½ | .120 | 308 |
| 3¾ | .120 | 282 |
| 4 | .134 | 303 |
| 4½ | .134 | 238 |
| 5 | .148 | 235 |
| 6 | .165 | 199 |

LAPWELDED BOILER TUBES UP TO AND INCLUDING 4 INCHES IN DIAMETER.

All lapwelded tubes shall be made of charcoal iron, or mild steel, made by any process.

American ingot iron, manufactured by the American Rolling Mill Co., Middletown, Ohio, shall be accepted as meeting the provisions for lapwelded tubes.

SURFACE INSPECTION.

Tubes shall be free from defective welds, cracks, blisters, scale, pits, and sand marks.

TESTS.

The following tests shall be made before shipment by the manufacturer:

(*a*) A test piece 2 inches in length cut from a tube shall stand being flattened by hammering until the sides are brought parallel and separated by a distance not greater than one-third the outside diameter of the tube, without showing cracks or flaws, the weld being 45° from the bend.

(*b*) A second tube shall have a flange turned over at right angles to the body of the tube and shall have a width equal to three-eighths of an inch. Tubes less than 3 inches in diameter shall only be re-

quired to have a flange turned equal to one-eighth of the diameter of the tube. This test shall not be applied to threaded stay tubes.

All the work shall be done cold.

Each tube shall stand an internal hydrostatic pressure of 1,000 pounds per square inch and shall be struck near both ends while under pressure with a 2-pound hammer or its equivalent without showing signs of weakness or defects.

All steel tubes, except those made of open-hearth steel, shall have the ends properly annealed by the manufacturer before shipment.

All tubes shall stand expanding, flanging over on the tube plate, and beading without flaws, cracks, or opening at the weld, except threaded stay tubes.

### LAPWELDED BOILER TUBES OVER 4 INCHES UP TO AND INCLUDING 30 INCHES IN DIAMETER.

All lapwelded boiler tubes over 4 inches in diameter, up to and including 30 inches in diameter, shall be made of wrought iron or mild steel, made by any process.

American ingot iron, manufactured by the American Rolling Mill Co., Middletown, Ohio, shall be accepted as meeting the provisions for lapwelded tubes.

(*a*) A test piece, 2 inches in length, cut from a tube, shall stand being flattened by hammering until the sides are brought parallel and separated by a distance not greater than one-third the outside diameter of the tube, without showing cracks or flaws, with the weld being 45° from the bend.

Each tube shall stand an internal hydrostatic pressure of 500 pounds per square inch and shall be struck near both ends while under pressure with a 2-pound hammer or its equivalent without showing signs of weakness or defects.

All steel tubes except those made of open-hearth steel shall have ends properly annealed by the manufacturer before shipment.

All tubes shall stand drilling, riveting, and calking, and work necessary to install them into the tube head without showing any weakness or defects.

### SEAMLESS STEEL BOILER TUBES.

#### MATERIAL.

The steel shall be made by the open-hearth process.

#### SURFACE INSPECTION.

Tubes shall be free from all surface defects. The defects to be particularly avoided in seamless tubes are tears, snakes, checks, slivers, scratches, laps, pits, rings, and sinks.

All seamless steel cold-drawn tubes shall be annealed as a final process. One or more tubes shall be selected at random from each charge of annealing furnace, and coupons cut from same for testing.

(*a*) A piece 3 inches long cut from the first tube shall stand being flattened by hammering until the sides are brought parallel and sepa-

rated by a distance not greater than one-third the outside diameter of the tube, without showing cracks or flaws.

(*b*) A flange shall be turned all around the end of the tube to a width equal to three-eighths of an inch beyond the outside body of the tube. Tubes less than 3 inches in diameter shall only be required to have a flange turned equal to one-eighth of the diameter of the tube. This test shall not be applied to threaded stay tubes.

Tests (*a*) and (*b*) shall be done cold.

Where hot-finished tubes are furnished, the tubes shall pass the same manipulating tests as cold-drawn tubes and shall be subject to the same conditions as to gauge, but do not have to be annealed.

Each tube shall be subjected to an internal hydrostatic pressure of 1,000 pounds per square inch without showing signs of weakness or defects.

All tubes, except threaded stay tubes, shall stand expanding, flanging over on the tube plate, and beading without flaw or crack.

All tubes shall be carefully gauged and shall not be less than the specified thickness.

No tube increased in thickness by welding one tube inside of another shall be allowed for use, but the ends of boiler tubes may be welded on for the purpose of making repairs, or new tubes may be welded for the purpose of making them longer: *Provided*, That such welding is not made by any process of autogenous welding.

### STATEMENT OR CERTIFICATE OF MANUFACTURER OF BOILER TUBES.

When the manufacturers of boiler tubes file with the Supervising Inspector General a certificate duly sworn to that all tubes manufactured by them will stand the tests and meet all the requirements of the foregoing rule, they shall be accepted by inspectors of this Service and no other affidavit will be required. (Secs. 4405, 4418, R. S.)

### STAYS.

16. The maximum working pressure in pounds allowable per square inch of cross-sectional area for stays used in the construction of marine boilers where same are accurately fitted normal to supported surfaces and properly secured shall be ascertained by the following formula:

$$P = \frac{A \times C}{a}$$

Where P = working pressure in pounds.
A = least cross-sectional area of stay in inches.
a = area of surface supported by one stay in inches.
C = a constant.
C = 9,000 for tested steel stays 1 inch and upward in diameter when such stays are not forged or welded. The ends may be upset to a sufficient diameter to allow for the depth of the thread. The diameter shall be taken at the bottom of the thread, provided it is the least diameter of the stay. All such stays after being upset shall be thoroughly annealed.

Where C = 8,000 for a tested Huston or similar type of brace, the cross-sectional area of which exceeds 5 square inches.

C = 7,000 for such tested braces when the cross-sectional area is not less than 1.227 and not more than 5 square inches, provided such braces are prepared at one heat from a solid piece of plate without welds.

C = 7,500 for wrought-iron stays 1 inch and upward in diameter when made of the best quality of refined iron. The ends may be upset to allow for the depth of the thread. The diameter shall be taken at the bottom of the thread, provided it is the least diameter of the stay. Such stays may be welded.

C = 6,000 for welded crowfoot stays when made of best quality of refined wrought iron, and for all stays not otherwise provided for when made of the best quality of refined iron or of steel without welds.

*Example.*

Required the working pressure of a stay 1 inch in diameter, pitched 6 by 6 inches center to center.

$$\text{Working pressure} = \frac{(1 \times 1 \times 0.7854) \times 6{,}000}{6 \times 6} = 130.9 \text{ pounds.}$$

Stay bolts and stays made of the best quality of refined wrought iron may be welded. The lengthening of steel stays by welding shall not be allowed.

TO DETERMINE THE AREAS OF DIAGONAL AND GUSSET STAYS.

Multiply the area of a direct stay required to support the surface by the slant or diagonal length of the stay; divide this product by the length of a line drawn at right angles to surface supported to center of palm of diagonal stay. The quotient shall be the required area of the diagonal stay.

$$A = \frac{a \times L}{l}$$

Where A = sectional area of diagonal stay.
a = sectional area of direct stay.
L = length of diagonal stay.
l = length of line drawn at right angles to boiler head or surface supported to center of palm of diagonal stay.

Given diameter of direct stay = 1 inch, a = 0.7854, L = 60 inches, l = 48 inches, substituting and solving,

$$A = \frac{0.7854 \times 60}{48} = 0.981 \text{ sectional area.}$$

Diameter = 1.11 inches = $1\frac{1}{8}$ inches.

The sectional area of gusset stays, when constructed of triangular right-angled web plates secured to single or double angle bars along the two sides at right angles, shall be determined by formula

for diagonal stays, and shall be not less than 10 per cent greater than would be necessary for a diagonal bolt stay.

The diameter of a screw stay shall be taken at the bottom of the thread, provided it is the least diameter of the stay.

For all stays the least sectional area shall be taken in calculating the stress allowable.

All screw stay bolts shall be drilled at the ends with a three-sixteenths-inch hole to at least a depth of one-half inch beyond the inside surface of the sheet. Stays through laps or butt straps may be drilled with larger hole to a depth so that the inner end of said larger hole shall not be nearer than the thickness of the boiler plates from the inner surface of the boiler. Hollow-rolled screw stay bolts may be used.

Flexible stay bolts that are made with a ball in socket on one end, the socket screwed into the outside sheet and covered with a removable cap and bolt screwed into the inside sheet and riveted over, may be used for staying flat surfaces without being drilled with a telltale hole.

Holes for screw stays shall be tapped fair and true, and full thread.

The ends of stays which are upset to include the depth of thread shall be thoroughly annealed after being upset.

The sectional area of pins to resist double shear and bending, accurately fitted and secured in crowfeet, sling, and similar stays, shall be at least equal to eight-tenths of the required sectional area of the brace. Breadth across each side and depth to crown of eye shall be not less than 0.35 of diameter of pin. In order to compensate for inaccurate distribution the forks shall be proportioned to support two-thirds of the load, thickness of forks to be not less than 0.66 of the diameter of pin.

The combined sectional area of rivets used in securing tee irons and crowfeet to shell, said rivets being in tension, shall be not less than the required sectional area of brace. To insure a well-proportioned rivet point, rivets shall be of sufficient length to completely fill the rivet holes and form a head equal in strength to the body of the rivet. All rivet holes shall be drilled. Distance from center of rivet hole to edge of tee irons, crowfeet, and similar fastenings shall be so proportioned that the net sectional areas through sides at rivet holes shall equal the required rivet section. Rivet holes shall be slightly countersunk in order to form a fillet at point and head.

When sling stays are connected by pins to angles secured to shell (see figs. 1 and 2 in sec. 12 of Rule II), said angles shall be of sufficient depth to resist shear. Section to resist shear shall be determined by the following formula:

$$A = D \times 2T$$

$$D = \frac{A}{2T}$$

Where A = sectional area of pin.
D = depth from edge of pinhole to end of leg.
2T = thickness of two angles.

*Example.*

Diameter of sling stay, 2 inches. Diameter of pin, 1.6 inches. Thickness of angle, seven-eighths of an inch. Required the depth from edge of pinhole to end of leg.

Substituting values and solving:

$$D=\frac{0.7854\times 1.6\times 1.6}{2\times 0.875}=1.15 \text{ inches.}$$

Minimum diameter of rivets shall be found as follows:

$$\text{Minimum diameter}=\sqrt{\frac{\text{load}}{0.7854\times 12{,}000\times N}}$$

Where N equals number of rivets. Rivets shall be staggered in each leaf.

TESTS OF BARS FOR STAYS AND BRACES.

All steel bars to be used as stays or braces in marine boilers and allowed a stress of 7,000, 8,000, or 9,000 pounds per square inch of section, tested by the United States inspectors at the mills where the material is manufactured, shall be tested in the following manner: There shall be taken from each heat two pieces for tensile tests and two pieces for bending tests. The full-size bars within the capacity of the testing machine may be used for tensile tests. Where the full size of the bar is too large for the capacity of the testing machine, the bar may be reduced in size to meet such capacity. To facilitate and insure accurate tests, all bars for tensile and bending tests may be reduced in size. The minimum tensile strength of each test piece shall be not less than 58,000 pounds per square inch of section and each test piece that has been reduced in size shall show an elongation of at least 28 per cent in 2 inches. Where the full size of the bar has been used for testing, the test piece shall show an elongation of at least 25 per cent in 8 inches. When the tensile strength of the test piece is more than 63,000 pounds per square inch of section, each test piece that has been reduced in size shall show an elongation of at least 26 per cent in 2 inches. Where the full size of the bar has been used for testing, each test piece shall show an elongation of at least 22 per cent in 8 inches. The pieces for the bend test shall be bent cold to a curve, the inner radius of which is equal to one and one-half times the diameter of the bar without flaws or cracks. Should any such test bar fail in either the tensile or bending test, no bars from such heat shall be allowed to be used in the construction of any marine boiler. Where a heat of steel bars has been passed by an inspector, separate lots of bars from such heat may be furnished to different boiler manufacturers upon a certificate from the mill that the bars were made from such accepted heat.

Boiler manufacturers desiring to use tested steel stays or braces shall be required to furnish the inspectors with the following form of affidavit, duly filled in:

[Form 937.]

STATE OF ——, *County of* ——, *ss:*

I hereby certify that I am the ..... ..... of the steam boiler works named .....
(State "owner" or name position.)
situated at ....., in the State of ....., and that the lot or lots of steel bars from which the test bars were taken and tested by the inspector on the ..... day of ..... 19.., and allowed for use in the steam boiler—, to be constructed for the steamer....., and to be allowed a strain not to exceed ..... pounds per square inch of section as a working steam pressure, will be used in the construction of the boiler— for the steamer ....., and no material for any braces, stays, or stay bolts required to be made of tested material and to carry a strain equal to ..... pounds per square inch of section will be used as braces, stays, or stay bolts in the construction of the boiler— for the said steamer unless tested by the inspector and approved by him in accordance with the requirements of law.

(Signature) ..... .....

Subscribed and ..... to before me this ..... day of ....., 19...
(Sworn or affirmed.)

[NOTARY'S SEAL.] (Signature) ..... .....,
*Notary Public.*

(Secs. 4405, 4418, R. S.)

TOPS OF COMBUSTION CHAMBERS AND BACK CONNECTIONS.

17. Formula for girders over back connection and other flat surfaces:

$$\text{Working pressure} = \frac{C \times d^2 \times T}{(W - P) \times D \times L}$$

Where W = extreme width of combustion box in inches.
P = pitch of supporting bolts in inches.
D = distance between girders from center to center in inches.
L = length of girder in feet between supports.
$d$ = depth of girder in inches.
T = thickness of girder in inches.
C = 550 when the girder is fitted with 1 supporting bolt.
C = 825 when the girder is fitted with 2 or 3 supporting bolts.
C = 917 when the girder is fitted with 4 or 5 supporting bolts.
C = 963 when the girder is fitted with 6 or 7 supporting bolts.
C = 990 when the girder is fitted with 8 or more supporting bolts.

*Example.*

Given, W = 34 inches, P = 7.5 inches, D = 7.75 inches, L = 2.927 feet, $d$ = 7.5 inches, T = 2 inches, C = 825, then, substituting in formula,

$$\text{Working pressure} = \frac{825 \times 7.5 \times 7.5 \times 2}{(34 - 7.5) \times 7.75 \times 2.927} = 154.3 \text{ pounds.}$$

(Sec. 4418, R. S.)

FLAT SURFACES.

18. All stayed surfaces formed to a curve the radius of which is over 21 inches, excepting surfaces otherwise provided for, shall be deemed flat surfaces.

The maximum stress allowable on flat plates supported by stays shall be determined by the following formula:

$$\text{Working pressure} = \frac{C \times T^2}{P^2}$$

Where P = pitch of stays in inches when equally spaced in both directions.

When pitches of stays are unequal, $\frac{A^2+B^2}{2}$ is to be taken instead of $P^2$.

Where A = the pitch of stays in inches in one row.
B = distance in inches between two rows of stays.
T = thickness of plates in sixteenths of an inch.
C = 112 for screw stays with riveted heads, plates seven-sixteenths of an inch thick and under.
C = 120 for screw stays with riveted heads, plates above seven-sixteenths of an inch thick.
C = 120 for screw stays with nuts, plates seven-sixteenths of an inch thick and under.
C = 125 for screw stays with nuts, plates above seven-sixteenths of an inch thick and under nine-sixteenths of an inch.
C = 135 for screw stays with nuts, plates nine-sixteenths of an inch thick and above.
C = 160 for stays fitted with washers or doubling strips which have a thickness of at least 0.5 of the thickness of the plate and a diameter of at least 0.5 of the greatest pitch of the stay, riveted to the outside of the plates, and stays having one nut inside of the plate and one nut outside of the washer or doubling strip. For T take 72 per cent of the combined thickness of the plate and washer or plate and doubling strip.
C = 175 for stays with double nuts, having one nut on the inside and one nut on the outside of the plate, without washers or doubling plates.
C = 200 for stays fitted with doubling plates which have a thickness equal to at least 0.5 of the thickness of the plate reinforced, and covering the full area braced (up to the curvature of the flange, if any), riveted to either the inside or outside of the plate, and stays having one nut outside and one inside of the plates. Washers or doubling plates to be substantially riveted. For T take 72 per cent of the combined thickness of the two plates.
C = 200 for stays with plates stiffened with tees or angle bars having a thickness of at least two-thirds the thickness of plate and depth of webs at least one-fourth of the greatest pitch of the stays, and substantially riveted on the inside of the plates, and stays having one nut inside bearing on washers fitted to the edges of the webs that are at right angles to the plate. For T take 72 per cent of the combined thickness of web and plate. (Sec. 4418, R. S.)

### NAME PLATES.

19. There shall be fastened to each boiler a plate containing the name of the manufacturer of the material, the place where manufactured, the tensile strength, the name of the builder of the boiler, when and where built.

The date of the building of the boiler or boilers shall be determined by the month and year of issue of the first certificate of inspection which covers the boiler or boilers in question: *Provided*, That the boiler or boilers have not been used for any purpose previous to the inspection. (Sec. 4418, R. S.)

FUSIBLE PLUGS.

20. Fusible plugs for use in boilers of steam vessels under the jurisdiction of the Steamboat Inspection Service shall be made of a bronze casing with the bore tapering continuously and evenly from end to end, and filled from end to end with tin not less than 99.7 per cent pure and to contain not more than 0.1 per cent of lead and not more than 0.1 per cent of zinc. The small end of the bore may be countersunk not more than one-fourth of an inch in depth and width, but no recess, thread, or cavity other than this countersink shall be allowed.

Fusible plugs, except those which are hereafter provided for, shall have an external diameter of not less than three-fourths of an inch pipe tap, and the filling shall be at least one-half of an inch in diameter at the smaller end, and shall have a larger diameter at the opposite end of the plug: *Provided, however*, That all fusible plugs fitted in boilers carrying a steam pressure exceeding 150 pounds to the square inch may be reduced at the smaller end of the filling to five-sixteenths of an inch in diameter.

Every boiler other than boilers of the water-tube type shall be fitted with at least two fusible plugs as described above, and located as follows:

Upright boilers shall be fitted with two fusible plugs of an external diameter of not less than three-eighths of an inch pipe tap, the filling to be at least one-fourth of an inch in diameter at the smaller end and shall have a greater diameter at the opposite end. The fusible plugs shall be located in separate tubes not more than 2 inches below the lowest gauge cock.

Externally heated cylindrical boilers, with flues, shall have one plug in the top of the upper flue, not more than 4 feet from the back end of the flue, and shall also have a plug fitted to the shell of the boiler immediately below the fire line, and not less than 4 feet from the front end: *Provided, however*, That when the flues are not more than 6 inches in diameter fusible plugs of not less diameter than three-eighths of an inch pipe tap may be used in such flues.

Fire-box, Scotch, and other types of shell boilers not specially provided for, having a combustion chamber common to all furnaces shall have two plugs fitted to the crown sheet of the combustion chamber at or near the center of the crown sheet and not more than 12 inches apart.

Double-end boilers with separate combustion chambers, each of which combustion chambers is common to all furnaces in its own end of the boiler, shall have two plugs fitted to the crown sheet of each combustion chamber at or near the center of the crown sheet, and not more than 12 inches apart.

Boilers fitted with a separate combustion chamber for each individual furnace shall be fitted with a fusible plug in the center of the crown sheet of each combustion chamber.

Boilers of types not herein provided for shall be fitted with at least two fusible plugs of such dimensions and located in such parts

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of the boiler as will, in the judgment of the local inspectors, best meet the purposes for which they are intended.

Fusible plugs shall be renewed at each annual inspection, but in cases where the plugs were installed or renewed not more than 6 months prior to the annual inspection, they may be allowed until the next following annual inspection or for a period not to exceed 18 months. In such cases, however, the inspector shall satisfy himself at the annual inspection that the plugs are in such condition as to warrant their continued use until the next annual inspection, after which the plugs shall be renewed at each and every annual inspection.

Fusible plugs shall be so fitted that the smaller end of the filling is exposed to the fire, and shall be at least 1 inch higher on the water side than the plate or flue in which they are fitted.

Notwithstanding anything which may be contained in this rule, fusible plugs shall be so fitted that the end of the filling on the water end of the plug is not less than 1 inch above the dangerous low-water level.

Each manufacturer of fusible plugs shall number all plugs in accordance with the number of the heat from which the plugs were filled. For instance, the first pouring shall be number 1, and all plugs filled from this heat shall be numbered 1; the next pouring shall be number 2, and all the plugs filled from this heat shall be numbered 2, etc.

The heat number shall be plainly stamped on each end of filling with numbers not less than $\frac{1}{12}$ inch in height.

Manufacturers of fusible plugs shall furnish the Supervising Inspector General a sample plug from each heat for examination and test, but where more than 250 plugs are poured from the same heat a sample plug shall be furnished for each 250 plugs or fraction thereof. The samples furnished shall bear the same number for any one heat and shall represent the heat from which the sample is poured.

In transmitting samples of fusible plugs to the Supervising Inspector General, the fusible plugs and the letters of transmittal shall be addressed as follows: "Supervising Inspector General, Steamboat Inspection Service, Department of Commerce, Washington, D. C."

One letter of transmittal shall be required for each heat.

In letter of transmittal the following information shall be stated:

Number of heat.

Number of fusible plugs manufactured from the heat.

Number of samples of fusible plugs from the heat transmitted.

Name of manufacturer or initials stamped on casing of plug.

Manufacturers of fusible plugs shall stamp on the larger end or face of the casing their name or initials for identification and shall file with the Supervising Inspector General of the Steamboat Inspection Service at Washington, D. C., a certificate duly sworn to that such plugs are filled with tin of the character required by this rule and made in accordance therewith.

Following is a general form of affidavit to be followed by manufacturers of fusible plugs:

STATE OF ———, *County of* ———.

I hereby certify, on this ——— day of ———, 192–, that I am ——— ———, of the
(State owner or name position.)
manufactory of ———, at ———, in the State of ———; that all fusible plugs furnished for use in boilers of steam vessels under the jurisdiction of the Steamboat-Inspection Service by the said manufactory will be filled with tin of the character required, and

will be made in accordance with the rules and regulations of the Board of Supervising Inspectors, Steamboat-Inspection Service, governing the manufacture of fusible plugs; and that I am authorized to make this certificate.

———— ————.
(Signature of manufacturer.)

Subscribed and ——— to before me this ——— day of ———, 192–.
(Sworn or affirmed.)

(Sign.) ———— ————,
[NOTARY'S SEAL.] *Notary Public.*

The certificate shall be executed by some person having authority to make the statements contained therein.

On receipt of a properly executed affidavit by the Supervising Inspector General, the inspectors of the Steamboat Inspection Service and the merchant marine generally shall be notified. (Secs. 4405, 4418, R. S.)

GAUGE COCKS AND WATER GLASS.

21. All boilers, except flash boilers, shall be supplied with at least one reliable water gauge and at least three gauge cocks attached directly to each boiler. When the gauge glass and gauge cocks are connected to the boilers by a water column there shall be three additional gauge cocks inserted in the head or shell of boiler. The lower gauge cock in boilers more than 48 inches in diameter shall be not less than 4 inches above the top of the flues, tubes, or combustion chambers. In boilers less than 48 inches in diameter the lower gauge cock shall be not less than 2½ inches above the top of the flues, tubes, or combustion chambers. A gauge glass shall be considered a reliable water gauge, and a float such as used on western river steamers shall be considered on such boilers as a reliable water gauge: *Provided*, That when water-tube boilers have an efficient water column connected to the steam drum of said boiler at the top and the water manifold at the bottom, and such water column has a gauge glass and three gauge cocks fitted to same, and also is fitted with a valve or stopcock, both at top and bottom where the column is connected to the boiler, no gauge cocks shall be required in the head or shell of the drums of such water-tube boilers.

Double-end boilers shall have at least three gauge cocks and one water glass at each end.

In vertical boilers or boilers of the water-tube type the location of the lowest gauge cock shall be determined by the local inspectors. (Sec. 4418, R. S.)

STEAM GAUGES.

22. All boilers or sets of boilers shall have attached to them at least one gauge that will correctly indicate a pressure of steam equal to 80 per cent of the hydrostatic pressure applied by the inspectors. (Sec. 4418, R. S.)

SAFETY VALVES.

23. After June 30, 1928, no type of safety valve shall be used on any vessel coming under the jurisdiction of this service that has not been approved by the Board of Supervising Inspectors.

The manufacturers of safety valves shall file an affidavit with the Supervising Inspector General that the safety valves manufactured by them will be in all respects in accordance with the blue prints and specifications on file in the office of the Supervising Inspector General and shall permanently attach a name plate to the valves that shall

show the name of the manufacturer, the pressure the casing is guaranteed to stand, diameter, seat area, serial number, and capacity.

Before any safety valve is put into service, it shall be subjected to a pressure of one and one-half times the pressure it is to be subjected to when in actual service. (Sec. 4418, R. S.)

Safety valves when fitted either to the shell of boiler or steam drum may be fitted with internal dry pipes when made of standard steam pipe or of riveted material equal in thickness and when the combined openings in the dry pipe equal in area at least one and one-half times the opening of the valve.

The areas of all safety valves on boilers contracted for or the construction of which commenced on or after June 1, 1904, shall be determined in accordance with the following formula and table:

$$\text{Formula: } a = 0.2074 \times \frac{W}{P}$$

Where $a$ = area of safety valve, in square inches, per square foot of grate surface.

W = pounds of water evaporated per square foot of grate surface per hour.

P = absolute pressure per square inch = working gauge pressure + 15.

From which formula the areas required per square foot of grate surface in the following table are found by assuming the different values of W and P.

The figures ($a$) in table multiplied by square feet of grate surface give the area of safety valve or valves required.

When this calculation results in an odd size of safety valve, use next larger standard size.

*Examples.*

Boiler pressure = 75 pounds per square inch (gauge).

2 furnaces: Grate surface = 2(No.) × 5 feet 6 inches (long) × 3 feet (wide) = 33 square feet.

Water evaporated per pound of coal = 8 pounds.

Coal burned per square foot grate surface per hour = 12½ pounds.

Evaporation per square foot grate surface per hour = 8 × 12½ = 100 pounds. Hence W = 100 and gauge pressure = 75 pounds.

From table the corresponding value of $a$ is 0.230 square inch.

Therefore area of safety valve = 33 × 0.23 = 7.59 square inches.

For which the diameter is 3⅛ inches nearly.

Boiler pressure = 215 pounds.

6 furnaces: Grate surface = 6(No.) × 5 feet 6 inches (long) × 3 feet 4 inches (wide) = 110 square feet.

Water evaporated per pound coal = 10 pounds.

Coal burned per square foot grate surface per hour = 30 pounds.

Evaporation per square foot grate surface per hour = 10 × 30 = 300 pounds.

Hence W = 300, gauge pressure = 215, and $a$ = 0.270 (from table).

Therefore area of safety valve = 110 × 0.270 = 29.7 square inches, which is too large for one valve. Use two.

$$\frac{29.7}{2} = 14.85 \text{ square inches.}$$ Diameter = 4⅜ inches.

To determine the area of a safety valve for boiler using oil as fuel or for boilers designed for any evaporation per hour:

Divide the total number of pounds of water evaporated per hour by any number of pounds of water evaporated per square foot of grate surface per hour (W) taken from, and within the limits of, the table. This will give the equivalent number of square feet of grate surface for boiler for estimating the area of valve. Then apply the table as in previous examples.

*Example.*

Required the area of a safety valve for a boiler using oil as fuel, designed to evaporate 8,000 pounds of water per hour, at 175 pounds gauge pressure.

Make W = 200.

$\frac{8,000}{200} = 40$, the equivalent grate surface, in square feet.

For gauge pressure = 175 pounds and W = 200, from table, $a = 0.218$ square inch. $0.218 \times 40 = 8.72$ square inches, the total area of safety valve required for this boiler, for which the diameter is $3\frac{5}{16}$ inches nearly.

Any spring-loaded safety valve constructed so as to give an increased lift by the operation of steam after being raised from its seat, or any spring-loaded safety valve constructed in any other manner, so as to give an effective area equal to that of the aforementioned spring-loaded safety valve, may be used in lieu of the common lever-weighted valve on all boilers on steam vessels, and each spring-loaded valve shall be supplied with a lever that will raise the valve from its seat a distance of not less than that equal to one-eighth of the diameter of the valve opening; but in no case shall any spring-loaded safety valve be used in lieu of the lever-weighted safety valve without first having been approved by the Board of Supervising Inspectors.

The valves shall be so arranged that each boiler shall have at least one separate safety valve, unless the arrangement is such as to preclude the possibility of shutting off the communication of any boiler with the safety valve or valves employed. This arrangement shall also apply to lockup safety valves when they are employed.

The use of two safety valves may be allowed on any boiler, provided the combined area of such valves is equal to that required by rule for one such valve. Whenever the area of a safety valve, as found by the rule of this section, will be greater than that corresponding to $4\frac{1}{2}$ inches in diameter, two or more safety valves, the combined area of which shall be equal at least to the area required, shall be used.

Where escape pipes for safety valves are installed after July 1, 1926, the area of the escape pipes shall be at least equal to the area of the outlet furnished with the safety valve, and in no case shall the area be less than the area of inlet. The fitting shall be as short and straight as possible, and so arranged as to avoid undue stress upon the valve. Where the escape pipe is used for two or more safety valves, the area of the escape pipe shall equal the combined areas of all the safety valves.

Where safety valves are used with beveled seats, the seats shall have an angle of inclination of 45° to the center lines of their axes.

*Table of area of safety valves required per square foot of grate surface for different pressures and rates of evaporation.*

| P, absolute pressure per square inch. | Gauge pressure per square inch. | These figures represent evaporation in pounds per square foot of grate surface per hour (W)=pounds water evaporated per pound coal×pounds coal burned per square foot of grate surface per hour. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 | 360 | 380 |
| | | The figures below give *a*, the area in square inches required per square foot of grate surface at the above rate of evaporation. | | | | | | | | | | | | | | |
| 65 | 50 | 0.319 | 0.383 | 0.447 | 0.510 | 0.574 | 0.638 | 0.702 | 0.765 | 0.829 | 0.893 | 0.956 | ..... | ..... | ..... | ..... |
| 70 | 55 | .296 | .355 | .414 | .474 | .533 | .592 | .652 | .711 | .769 | .828 | .888 | ..... | ..... | ..... | ..... |
| 75 | 60 | .276 | .332 | .387 | .442 | .497 | .552 | .608 | .663 | .718 | .773 | .829 | ..... | ..... | ..... | ..... |
| 80 | 65 | .259 | .311 | .363 | .415 | .466 | .518 | .570 | .622 | .674 | .726 | .778 | ..... | ..... | ..... | ..... |
| 85 | 70 | .244 | .292 | .341 | .390 | .438 | .487 | .536 | .585 | .634 | .682 | .731 | ..... | ..... | ..... | ..... |
| 90 | 75 | .230 | .276 | .322 | .368 | .414 | .460 | .506 | .552 | .598 | .644 | .690 | ..... | ..... | ..... | ..... |
| 95 | 80 | .218 | .262 | .305 | .349 | .392 | .436 | .479 | .523 | .567 | .610 | .654 | ..... | ..... | ..... | ..... |
| 100 | 85 | .207 | .249 | .290 | .332 | .373 | .414 | .456 | .497 | .538 | .580 | .622 | ..... | ..... | ..... | ..... |
| 105 | 90 | .197 | .236 | .276 | .316 | .355 | .394 | .434 | .473 | .513 | .552 | .592 | ..... | ..... | ..... | ..... |
| 110 | 95 | .188 | .226 | .264 | .301 | .339 | .377 | .414 | .452 | .489 | .527 | .565 | ..... | ..... | ..... | ..... |
| 115 | 100 | .180 | .216 | .252 | .288 | .324 | .360 | .396 | .432 | .468 | .504 | .540 | ..... | ..... | ..... | ..... |
| 120 | 105 | .172 | .207 | .241 | .276 | .311 | .345 | .379 | .414 | .448 | .483 | .517 | ..... | ..... | ..... | ..... |
| 125 | 110 | .166 | .199 | .232 | .265 | .298 | .331 | .364 | .397 | .431 | .463 | .497 | ..... | ..... | ..... | ..... |
| 130 | 115 | .160 | .192 | .223 | .255 | .287 | .319 | .351 | .383 | .415 | .447 | .479 | ..... | ..... | ..... | ..... |
| 135 | 120 | .153 | .184 | .215 | .246 | .276 | .307 | .337 | .368 | .398 | .429 | .460 | ..... | ..... | ..... | ..... |
| 140 | 125 | .148 | .177 | .207 | .237 | .266 | .296 | .325 | .355 | .385 | .414 | .444 | ..... | ..... | ..... | ..... |
| 145 | 130 | .143 | .172 | .201 | .229 | .258 | .287 | .315 | .344 | .372 | .401 | .430 | ..... | ..... | ..... | ..... |
| 150 | 135 | .138 | .166 | .194 | .222 | .249 | .277 | .304 | .332 | .360 | .387 | .415 | ..... | ..... | ..... | ..... |
| 155 | 140 | .134 | .160 | .187 | .214 | .241 | .268 | .294 | .321 | .348 | .375 | .401 | ..... | ..... | ..... | ..... |
| 160 | 145 | .130 | .156 | .181 | .207 | .233 | .259 | .285 | .311 | .337 | .363 | .389 | ..... | ..... | ..... | ..... |
| 165 | 150 | .126 | .151 | .176 | .201 | .226 | .251 | .276 | .301 | .326 | .352 | .378 | ..... | ..... | ..... | ..... |
| 170 | 155 | .122 | .146 | .171 | .195 | .219 | .244 | .268 | .292 | .317 | .341 | .366 | ..... | ..... | ..... | ..... |
| 175 | 160 | .118 | .142 | .166 | .189 | .213 | .236 | .260 | .284 | .308 | .331 | .355 | ..... | ..... | ..... | ..... |
| 180 | 165 | .115 | .138 | .161 | .184 | .207 | .230 | .254 | .277 | .300 | .323 | .346 | ..... | ..... | ..... | ..... |
| 185 | 170 | .112 | .135 | .157 | .179 | .202 | .224 | .247 | .269 | .291 | .314 | .336 | ..... | ..... | ..... | ..... |
| 190 | 175 | .109 | .131 | .153 | .175 | .196 | .218 | .240 | .262 | .284 | .306 | .328 | ..... | ..... | ..... | ..... |

| | | |

Flat-seat safety valves may be used under the formula and table under the heading "Safety valves" in Rule II. The discharge capacity of a flat-seat valve shall be 1.4 times that allowed for a bevel-seat valve.

Hereafter no safety valves having a set-screw arrangement on top of the valve casing, designed to hold the valve down while the hydrostatic pressure is being applied, shall be allowed. On such valves now in use, inspectors shall require the set screws to be taken out and the hole permanently closed. This does not apply to any safety valve whose form of construction is such that the hole for the set screw or bolt is securely closed when the valve is locked.

### LEVER SAFETY VALVES.

All common lever safety valves to be hereafter applied to the boilers of steam vessels shall be constructed in material, workmanship, and principle according to the requirements for a safety valve referred to in this section. When this construction of a safety valve is applied to the boilers of steamers navigating rough waters, the link may be connected direct with the spindle of the valve: *Provided, always,* That the fulcrum or points upon which the lever rests are made of steel, knife or sharp edged, and hardened; in this case the short end of the lever shall be attached directly to the valve casing. In all cases the link requires but a slight movement not exceeding one-eighth of an inch.

### REQUIREMENTS IN CONSTRUCTION OF LEVER SAFETY VALVES.

All the points of bearing on lever shall be in the same plane.

The distance of the fulcrum shall in no case be less than the diameter of the valve opening.

The length of the lever shall not exceed the distance of the fulcrum multiplied by ten.

The width of the bearings of the fulcrum shall be not less than three-fourths of 1 inch.

The length of the fulcrum link shall be not less than 4 inches.

The lever and fulcrum link shall be made of wrought iron or steel and the knife-edged fulcrum points and bearings for the points shall be made of steel and hardened. But the chambers and saddle flanges of this and all other types of safety valves attached to boilers may be made of cast iron or other suitable material.

The valve, valve seat, and bushing for the stem or spindle shall be made of composition (gun metal) when the valve is intended to be attached to a boiler using salt water; but when the valve is to be attached to a boiler using fresh water and generating steam of a high pressure the parts named, with the exception of the bushings for the spindle, may be made of cast iron.

The valve shall be guided by its spindle, both above and below the ground seat and above the lever, through supports either made of composition (gun metal) or bushed with it.

The spindle shall fit loosely in the bearings or supports.

When the valve is intended to be applied to the boilers of steamers navigating rough waters, the fulcrum link may be connected directly with the spindle of the valve; providing always that the knife-edged fulcrum points are made of steel and hardened, and that the vertical movement of the valve is unobstructed by any lateral movement.

In all cases the weight shall be adjusted on the lever to the pressure of steam allowed in each case by a correct steam gauge attached to the boiler. The weight shall then be securely fastened in its position and the lever marked for the purpose of facilitating the replacing of the weight should it be necessary to remove the same, and in no case shall a line or any other device be attached to the lever or weight except in such a manner as will enable the engineer to raise the valve from its seat. (Sec. 4418, R. S.)

### WATER-TUBE AND COIL BOILERS.

24. Duplicate blue prints or drawings of water-tube and coil boilers, with their specifications, shall be submitted for approval to the Board of Supervising Inspectors (under sec. 4429, R. S.), and the design approved by said board, before the boilers will be allowed to be used on any vessel coming under the jurisdiction of the Board of Supervising Inspectors. After the approval of the design by the said board, 60 certified sets of the blue prints or drawings shall be furnished the Supervising Inspector General for the use of supervising and local inspectors. The blue prints or drawings necessary to comply with the foregoing provisions shall be supplied by the manufacturers. Manufacturers shall furnish local inspectors of districts where boilers are to be installed an affidavit certifying that the boilers are constructed in accordance with the specifications approved by the Board of Supervising Inspectors. (Sec. 4405, R. S.)

The working pressure allowable on cylindrical shells of water-tube or coil boilers, when such shells have a row or rows of pipes or tubes inserted therein, shall be determined by the following formula: *Provided*, That the working pressure allowable on such shells shall also be determined by the rule for cylindrical shells of boilers constructed of inspected plates, contained in section 2 of Rule II, and the lower working pressure allowable by the two rules shall be taken.

$$P = \frac{(D - d) \times T \times S}{D \times R}$$

Where P = working pressure allowable in pounds.
D = distance in inches between the tube or pipe centers in a line from head to head.
$d$ = diameter of hole in inches.
T = thickness of plate in inches.
S = one-fourth of the tensile strength of the plate.
R = radius of shell in inches.
$n$ = number of tube holes in a pitch. When tubes on any one row are pitched unequally, $nd$ must be substituted in the formula for $d$.

Where rows of tubes are pitched diagonally, each diagonal ligament shall be not less than three-fifths of each longitudinal ligament.

*Example.*

Required the working pressure of a cylindrical shell having holes 1 inch in diameter, spaced 2 inches from center to center, in a line from head to head; material, one-half of an inch thick; diameter of shell, 20 inches; tensile strength of plate, 60,000 pounds.

Substituting values, we have

$$P=\frac{(2-1)\times 0.5\times 12{,}000}{2\times 10}=300 \text{ pounds.}$$

PORCUPINE-TYPE BOILERS.

The formula for determining pressure on boilers of the so-called porcupine and similar types shall be as follows:

Multiply the vertical distance between the centers of the horizontal rows of tubes in inches by one-half the diameter of shell of boiler in inches, which gives the area upon which the pressure is exerted to break a diagonal ligament, then find the sectional area of the ligament at its smallest part and multiply by one-sixth the tensile strength of the material. This result divided by the area upon which the strain is exerted gives the working pressure per square inch, which is as follows: $\frac{E\ F\ T}{C\ D}=W$, the working pressure, in which E equals width of ligament in inches, F thickness of material in inches, T one-sixth of the tensile strength, C distance between vertical centers, and D one-half the inside diameter of the shell or central column.

For the boiler proposed, 30 inches diameter, five-eighths inch thick, tensile strength 60,000 pounds, 1.219 inches would be width of ligament, 0.625 thickness of plate, 10,000 one-sixth of tensile strength, $3\frac{11}{16}=3.6875$ inches, distance of vertical centers; 15 inches, one-half the diameter of shell, would be as follows: 1.219 multiplied by 0.625, this product multiplied by one-sixth the tensile strength, 10,000, equals 7,618.75. This product, divided by the product of 3.6875 distance between vertical centers, multiplied by 15, one-half the diameter, equals 55.3125, gives 137.7 as pressure allowed.

HYDROSTATIC PRESSURE.

All coil and pipe boilers hereafter made, when such boiler is completed and ready for inspection, shall be subjected at the first inspection to a hydrostatic pressure at a ratio of 150 pounds to a steam pressure of 100 pounds.

The use of malleable-iron or cast-steel manifolds, tees, return bends, or elbows in the construction of pipe generators shall be allowed, and the pressure of steam shall not be restricted to less than one-half the hydrostatic pressure applied to pipe generators unless a weakness should develop under such test as would render it unsafe in the judgment of the inspector making such inspection.

DRUMS AND HEADS.

All drums attached to coil, pipe, sectional, or water-tube boilers not already in use or actually contracted for, to be built for use on a steam vessel, and their building commenced at or before the date of the approval of this rule, shall be required to have the heads of wrought iron or steel or cast steel flanged and substantially riveted to the drums or secured by bolts and nuts of equal strength with rivets, in all cases where the diameters of such drums exceed 6 inches.

Drums and water cylinders constructed with a bumped head at each or either end, any opening in the shell or heads to be reinforced as required by the rules of the board, the circumferential and hori-

zontal seams to be welded and properly annealed after such welding is completed, and when tested with a hydrostatic pressure of at least double the amount of the steam pressure allowed may be used for marine purposes.

COPPER AND BRASS TUBES.

Seamless copper or brass tubes not exceeding three-fourths of an inch in diameter may be used in the construction of water-tube boilers or generators when liquid fuel is used. There may also be used in their construction copper or brass steam drums not exceeding 14 inches in diameter, of a thickness of material not less than five-eighths of an inch, and copper or brass steam drums 12 inches in diameter and under having a thickness of material of not less than one-half inch. All tubes and drums referred to in this paragraph shall be made from ingots or blanks drawn down to size without a seam. Water-tube boilers or generators so constructed may be used for marine purposes with none other than liquid fuel. (Sec. 4429, R. S.)

WELDING AND REINFORCING BY THE ELECTRIC, OXYACETYLENE, OR OTHER PROCESSES.

25. No repair work by any welding process shall be allowed on marine boilers until coupons showing the character of the work proposed to be done by the applicant shall have been tested and submitted, together with an explanation and report of the test, to the local inspectors of the district where the work is to be done. The local inspectors shall then satisfy themselves whether or not such process can be used with safety on the boilers of steam vessels.

In every case where repairs are to be made by these processes on boilers of steam vessels subject to the inspection of this Service, the engineer in charge and the parties making the repairs are required to notify the office of the local inspectors, giving a full detailed description of the repairs to be made, the location of the vessel, and the time the repairs are to be begun, so that inspection may be had, if practicable, prior to and during the time the work is being done, which reports must be confirmed in writing to the local inspectors.

The application for permission to use this process on boiler repairs of any particular vessel implies a guaranty on the part of the applicant that the work shall, in material, flux, and workmanship, be equal to that of the samples furnished.

The following repairs to marine boilers may be made by any process:

All calking edges on internally fired boilers may be reinforced by these processes.

Calking edges of the shells of externally fired boilers, above the fire line only, may be reinforced, but no welding shall be permitted below the fire line.

Cracks extending from edge of lap to rivet, except on seams below the fire line in externally fired boilers, may be welded.

Cracks not exceeding 30 inches in length in back connection sheets, wrapper sheets, bottoms of combustion chambers, heads, and other stayed surfaces may be repaired by welding.

Where cracks are repaired by welding, holes shall be drilled entirely through the plate at each extreme end of the crack, except in small cracks from rivet to calking edge.

Circumferential or lengthwise cracks not exceeding 20 inches in length in plain or corrugated furnaces may be welded.

Where plates in back sheets of back connections, wrapper sheets of sides and bottoms of back connections of any boilers, side sheets and legs of furnaces and bottoms of furnaces of fire-box boilers, and other stayed surfaces are reduced in thickness not exceeding 40 per cent of the original thickness, they may be reinforced, such reinforcing not to exceed an area of 400 square inches in any one plate.

When such reinforcing extends over stays and braces, such stays and braces shall come completely through the reinforcing so as to be plainly visible to the inspectors.

When the corroded portion of stayed or riveted surfaces of the back sheets or wrapper sheets or bottoms of back connections of any boilers, or side sheets and bottom sheets of furnaces or legs of fire-box boiler exceeds 400 square inches, the same may be repaired by the removal of the corroded portion and the replacement thereof by a new piece of plate, the edges of the new plate being welded in position.

Stay bolts, braces, or rivets shall pass through the body of the new plate as before, the area of the new piece not to exceed 24 by 24 inches, or 30 inches, in any one direction, the welded edges to be V'd or beveled along the joint prior to welding.

Where plates of shells and other parts of internally fired boilers subject to tensile strain are reduced in thickness by corrosion not to exceed 25 per cent of the original thickness, they may be reinforced, such reinforcing not to exceed an area of 200 square inches.

Where calking edges and laps have been reinforced, local inspectors shall require the rivets to be cut out and redriven if they find by inspection that it is necessary, but in no case shall they be calked.

Cracks not exceeding 24 inches in length in the shells of internally fired boilers may be repaired by reinforcing the plate to cover the crack with a piece of tested steel plate of not less than one-fourth inch in thickness, said reinforcing plate to be drilled with three-fourths inch holes not more than 3 inches apart. Such holes in the reinforcing plate shall be countersunk and spot welded through these to the shell of the boiler. The edges of the reinforcing plate shall also be welded to the shell of the boiler. This form of repairs shall only be allowed when made by the electric metallic arc process. Cracks not exceeding 24 inches in length in the shells of externally fired boilers above the fire line and in mud and steam drums may be reinforced by the above process.

Cracks extending through rivet holes in single-riveted or double-riveted seams in stayed surfaces of back connections of any boilers or side sheets of legs or bottoms of fire-box boilers which are stayed surfaces may be welded up to a length of 6 feet exclusive of rivet holes.

Where cracks extend through rivet holes in stayed surfaces, the piece extending from the rivet to the edge of the lap may be removed where convenient to do so, and the place where the piece has been removed may be replaced by being built up and reinforced by either of these processes.

Where leaks develop around stay bolts and the stay bolts are otherwise intact, the nuts may be removed from the ends of the stay bolts, and the stay bolts may be welded into the shell by welding a beveled collar or ring around the stay bolt. The width and depth of

such collar shall equal one-half of the diameter of the stay bolt. In all such cases of applying welding rings or collars around stay bolts, the material shall be hammered while in a glowing state as it is applied.

In all cases where metal is deposited on stayed surfaces, the operator shall hammer, when practicable, the deposited metal while it is in a glowing state.

Cracks in wrought-iron or wrought-steel headers, and cracks or sand holes in cast-steel, semisteel, ferrosteel, malleable-iron or cast-iron headers, manifolds, crosses, tees, and ells may be repaired by welding cracks or flowing metal into sand holes. Such repaired material other than headers and manifolds shall be subjected to a hydrostatic test of three and one-half times the working pressure after such repairs are made. Reinforcing by building up of any of the above-mentioned articles other than headers shall not be allowed.

When crown-bar bolts have deteriorated or wasted away at top of combustion chamber under the crown bars, such deterioration not to exceed 25 per cent of the original diameter of the bolt, such bolts may be built up or reinforced by any process of autogenous welding.

Where tube sheets of boilers have deteriorated not to exceed 25 per cent of their original thickness, or where cracks have developed in tube sheets, the same may be reinforced and repaired by any process of autogenous welding, and the beading on the ends of tubes may be welded to the tube sheets by the same process.

Any feature of welding not covered by these rules may be accepted and approved by the Supervising Inspector General if, in his opinion, it meets with the obvious intent of the rule. (Secs. 4405, 4418, R. S.)

### FEED WATER.

26. Feed water shall not be admitted into any marine boiler at a temperature less than 100° F., and every such boiler, excepting donkey boilers, shall, after October 31, 1909, have an independent auxiliary feed appliance for supplying said boiler with water in addition to the usual mode employed, which auxiliary feed shall enter the boiler through an opening and a fitting which are entirely independent of the fitting and opening for the main feed. (Sec. 4418, R. S.)

### MAIN STEAM PIPE.

27. The thickness of and pressure allowed on main steam pipe constructed of riveted iron or steel plates that have been stamped and tested as required by section 4430, Revised Statutes, shall be determined in the same manner as required by section 4433, Revised Statutes, to determine the pressure allowable on boilers.

The thickness of and steam pressure allowable on all lapwelded or solid-drawn steam pipe of wrought iron or steel shall be determined by the following formulas:

$$T = \frac{P \times D}{10{,}000} + 0.125$$

$$P = \frac{(T - 0.125) \times 10{,}000}{D}$$

Where P = pressure of steam allowable in pounds.
T = thickness of pipe.
D = diameter of pipe.

*Example.*

Given P = 200 pounds pressure. D = 5 inches in diameter. Substituting and solving for T,

$$T = \frac{200 \times 5}{10{,}000} + 0.125 = 0.225 \text{ inch.}$$

Substituting and solving for P,

$$P = \frac{(0.225 - 0.125) \times 10{,}000}{5} = 200 \text{ pounds.}$$

WELDED STEAM AND WATER PIPES.

From one-eighth of an inch inside diameter up to and including 30 inches inside diameter.

The pipe shall be made of wrought iron or mild steel, smooth, straight, and free from defects.

Threaded pipe of standard thickness shall be avoided as far as possible. In steam pipes it is a very serious matter and shall not be allowed in any case on standard pipe over 5 inches in diameter.

All pipe over 2 inches in diameter shall be lapwelded.

TESTS.

The following tests shall be made before shipment by the manufacturer:

One-eighth inch inside diameter up to and including 3½ inches inside diameter shall be tested before shipment to 600 pounds per square inch hydrostatic pressure and not subject to any other test.

For all diameters greater than 3½ inches inside:

(*a*) *For steel.*—A test piece 2 inches in length cut from a pipe shall stand being flattened by hammering until the sides are brought parallel with the curve on the inside at the ends not greater than one-third the outside diameter of the pipe without showing cracks or flaws, the weld being 45° from the curve.

*For iron.*—A test ring three times the thickness in length cut circumferentially from lapwelded wrought-iron pipe shall be crushed down to an inner diameter of one-third the outside diameter of the pipe. Wrought-iron pipe will not stand this test without fracture, but no lapwelded wrought-iron pipe shall be accepted where the break is short or crystalline or shows evidence of defective material or bad welding, and in every case the fiber of the iron shall be shown.

(*b*) Pulling tests shall be made from every 50 pieces furnished, or fraction thereof, and shall show the following results:

*For Bessemer steel.*—Tensile strength not less than 50,000 pounds per square inch. Elongation in 8-inch specimen, not less than 20 per cent.

*For open-hearth steel.*—Tensile strength not less than 45,000 pounds per square inch. Elongation in 8-inch specimen, not less than 20 per cent.

*For iron.*—Tensile strength, 40,000 to 48,000 pounds per square inch. Elastic limit, 22,000 to 30,000 pounds. Elongation in 8-inch specimen, not less than 12 per cent.

All pipe from 4-inch diameter up shall be tested before shipment to not less than 500 pounds per square inch hydrostatic pressure.

### SEAMLESS STEEL STEAM AND WATER PIPES.

#### MATERIAL.

The steel shall be made by the open-hearth process.

#### SURFACE INSPECTION.

Pipe shall be free, inside and outside, from all surface defects that would materially weaken it or form starting points of corrosion. The defects to be especially avoided are snakes, checks, slivers, laps, pits, etc. Pipe shall be smooth and straight.

#### TESTS.

The following tests shall be made before shipment by the manufacturer:

(*a*) A test piece, 2 inches in length, cut from a pipe, shall stand being flattened by hammering until the sides are brought parallel with the curve on the inside at the ends not greater than one-third the outside diameter of the pipe, without showing cracks or flaws.

(*b*) Pulling tests shall be made from every 50 pieces furnished, or fraction thereof, and shall show the following results:

Tensile strength, not less than 48,000 pounds per square inch.

Elongation in 8-inch specimen, not less than 12 per cent.

The name or brand of the manufacturer shall be legibly rolled in raised characters or stamped on the outer surface of each pipe.

### STATEMENT OR CERTIFICATE OF MANUFACTURER OF STEAM AND WATER PIPES.

When the manufacturers of steam and water pipes file with the Supervising Inspector General a certificate duly sworn to that all such pipes manufactured by them will stand all the tests and meet all the requirements of the foregoing rule, they shall be accepted by inspectors of the service and no other affidavit will be required.

Lapwelded or solid-drawn pipe of wrought iron or steel may be used for mud or steam drums not exceeding 24 inches in diameter for use on boilers when the ends of the pipe have been properly annealed before the holes are drilled or the heads are riveted in.

When pipe is used for steam lines where flanges are riveted on and calked, the ends of the pipe shall be properly annealed before drilling or riveting the flanges on.

### FLANGES AND CONNECTIONS FOR WROUGHT-IRON AND HOMOGENEOUS-STEEL FEED AND STEAM PIPE.

The terminal and intermediate flanges of all wrought-iron and homogeneous-steel feed and steam pipe over 2 inches in diameter, other than on pipe or coil boilers or steam generators, shall be made of wrought iron, homogeneous steel, malleable iron having a tensile strength of not less than 30,000 pounds per square inch of section, or equivalent material.

All such flanges shall have a depth through the bore of not less than one-half of the diameter of the pipe to which the flange is attached.

The bore shall increase slightly toward the face of the flange, and the end of the pipe shall be enlarged to fit the bore of the flange,

and shall be substantially beaded over or outward into a recess in the face of the flange.

Flanges on extra heavy lapwelded steam pipe up to and including 5 inches diameter may be attached with screw threads and the joints in bends may be made with extra-heavy malleable-iron elbows or equivalent material.

Feed and steam pipe up to and including 3 inches diameter may be connected at intermediate joints by being screwed into flanges or extra-heavy fittings.

Flanges of cast iron, semisteel, or ferrosteel, having a tensile strength of not less than 20,000 pounds per square inch of section, may be employed in connecting extra-heavy lapwelded pipe by screw threads. Such flanges shall be extra heavy and have a depth through the bore of not less than the United States standard length of thread for the pipe to which the flange is attached plus depth of counterbore. The thickness of the flange, excluding hub, shall be not less three-tenths of the diameter of the pipe plus 0.25 of an inch. The pipe shall fit snugly in the counterbore, which shall be not less than one-fourth the diameter of the pipe in depth.

Flanges of wrought iron or steel grooved in the bore to a depth equal to the thickness of the material in the pipe shall be allowed for use on all steam and feed pipe when the end of the pipe has been thoroughly annealed and expanded into the flange by approved machinery.

Flanges with hubs projecting not less than 1¾ inches from the back of the flange may be shrunk on lapwelded or riveted-iron or steel or seamless-drawn steel steam pipes over 5½ inches diameter where the pipe is brought to a true and parallel circle at the end and beaded over into a recess at the face of the flange, or flared to an angle of approximately 20°, or the bore of the flange may be tapered and the pipe expanded into the bore.

Flanges of cast steel, wrought iron, or homogeneous steel, equal in strength to the pipe to which it is attached, may be riveted to the pipe.

Flanges may be secured to pipe by expanding the pipe by proper and approved machinery and flaring the end of the pipe to an angle not exceeding 20°, taken in the direction of the length of the pipe, and having a depth of flare equal to at least one and one-half times the thickness of the pipe.

Flanges of cast steel, forged steel, or wrought iron may be used in any process of expanding the pipe into grooves in the bore of the flange and flaring the end of the pipe to an angle of 20°.

Flanges welded to lapwelded steam pipes of iron or steel may be used when the manufacturer furnishes an affidavit that the pipe has been properly annealed after all work requiring fire has been finished.

All flange connections made by the process of expanding, welding, or shrinking shall be subjected to a hydrostatic test of twice the working pressure without showing signs of weakness.

### FLANGES ON COPPER PIPE.

The flanges of all copper steam and feed pipe over 3 inches diameter shall be made of brass or bronze composition, forged-iron or steel or open-hearth steel castings. The end of the pipe shall be flanged over or outward to width of not less than twice the thickness of the pipe

and to a radius of not more than the thickness of the pipe, and the flange securely brazed or riveted to the pipe. If the pipe is properly formed with a fully reinforced taper through the flange, the riveting or brazing may be dispensed with. The thickness of flanges shall be not less than four times the required thickness of the pipe plus 0.25 of an inch.

Any form of expanded, grooved, and flared joint will be allowed for copper pipe under the same regulations, restrictions, and tests applying to iron or steel pipe.

All flange joints shall be fitted with such number of bolts or rivets as well make the joint equal in strength to all other parts of the pipe

Any form of joint which, in the judgment of local inspectors, is equal in strength and efficiency to the flange connections required by this rule shall be allowed on any and all classes of pipe.

### COPPER PIPE.

No copper pipe constructed after June 30, 1905, shall have any bend whose radius is less than one and one-half times the diameter of the pipe and such pipe shall be so led and flanges so placed that they may be readily taken down if required. Such pipes shall be protected by iron casings when run through coal bunkers, and shall be clear of the coal chutes. The thickness of material, according to the working pressure, shall be determined by the following formula:

$$T = \frac{P \times D}{8{,}000} + 0.0625.$$

Where T = thickness in inches.
P = working pressure.
D = inside diameter of pipe in inches.

*Example.*

Required the thickness of material of a 5-inch copper pipe for a working pressure of 175 pounds per square inch.

Substituting values, we have

$$T = \frac{175 \times 5}{8{,}000} + 0.0625 = 0.171 \text{ inch.}$$

*Provided, however,* That all copper pipe subject to pressure and installed for use on steam vessels after July 1, 1911, shall have a thickness of material according to the working pressure, to be determined by the following formula:

$$T = \frac{P \times D}{6{,}000} + 0.0625.$$

Where T = thickness in inches.
P = working pressure.
D = inside diameter of pipe in inches.

*Example.*

Required the thickness of material of a 5-inch copper pipe for a working pressure of 175 pounds per square inch.

Substituting and solving, we have

$$T=\frac{175\times 5}{6,000}+0.0625=0.208.$$

SLIP JOINTS.

The wearing surface of the male pipe in all slip joints made after June 30, 1908, for use in steam pipes shall be made of copper or composition, and shall be of sufficient length and so adjusted as to prevent accidental withdrawal from the packing box. When made of composition, same shall be of not less than 95 per cent copper, tin, and zinc, possessing a tensile strength of not less than 30,000 pounds to the square inch. It may be used for sizes up to and including 12 inches in diameter, and for all pressures not exceeding 300 pounds per square inch.

The minimum thickness of such fittings shall be determined by the following formula:

$$T=\frac{P\times D}{4,000}+0.22$$

Where P = working pressure in pounds.
D = diameter in inches.
T = thickness in inches.

(Secs. 4405, 4418, R. S.)

CAST STEEL, SEMISTEEL, FERROSTEEL, CAST IRON, MALLEABLE IRON, COMPOSITIONS MADE OF COPPER, TIN, AND ZINC, AND OTHER COMPOSITIONS PROPOSED TO BE USED IN THE MANUFACTURE OF VALVES, FITTINGS, AND OTHER APPLIANCES.

28. Cast-steel fittings of any size or character and for any pressure and for any temperature may be used for any and all steam and feed-pipe connections, and for valves, cocks, and all appliances subject to steam or water pressure, when made by regular processes and by manufacturers who stamp such fittings and appliances with their trade-mark or identifying stamp and who guarantee the castings to possess the following physical characteristics: Tensile strength, minimum, 50,000; maximum, 78,000 pounds per square inch; elastic limit, minimum, not less than 45 per cent of tensile strength; elongation in 2 inches, minimum, 25 per cent. There shall be taken from each heat an annealed coupon or coupons, for the purpose of determining the physical tests, and the manufacturers shall furnish coupons to the local inspectors for tests when so required. All steel castings shall be thoroughly annealed.

The minimum thickness of steel fittings shall be determined by the following formula:

$$T=\frac{P\times D}{7,000}+0.188$$

Where P = working pressure in pounds.
D = diameter in inches.
T = thickness in inches.

Cast iron, semisteel, or ferrosteel, possessing a tensile strength of not less than 22,000 pounds to the sectional square inch, may be

used in the construction of valves and fittings for pressures not exceeding 300 pounds when such valves and fittings of 3 inches diameter or over are stamped with the trade-mark or identifying stamp of the manufacturer, and made in accordance with the following formula:

$$T = \frac{P \times D}{3,000} + 0.25$$

Where T = thickness of casting in inches.
P = pressure of steam allowable in pounds.
D = internal diameter of the largest opening contained in the cylindrical part of the casting.

The above materials may also be used in the construction of manhole and handhole plates.

The headers of superheaters may be made of semisteel (so-called) in which the constituent part of high-grade uniform steel thereof shall be not less than 25 per cent and that the material shall have a tensile strength of not less than 28,000 pounds per square inch. The material must be soft and close-grained and the castings shall be tight under a hydrostatic pressure of 850 pounds per square inch.

Malleable iron possessing a tensile strength of not less than 30,000 pounds to the sectional square inch may be used in the construction of valves and fittings up to and including 6 inches in diameter, and for pressures not exceeding 300 pounds. Such valves and fittings of 3 inches diameter or over shall be extra heavy, the fittings beaded or banded, and the valves and fittings stamped with the trade-mark or identifying stamp of the manufacturer.

Hard brass, bronze, and other compositions, of which 95 per cent is copper, tin, and zinc, possessing a tensile strength of not less than 30,000 pounds to the square inch, may be used in the construction of all valves and fittings up to and including 12 inches in diameter, and for all pressures not exceeding 300 pounds per square inch. All such fittings of 3 inches in diameter or over shall be stamped with the trade-mark or identifying stamp of the manufacturer.

### VALVES.

Each and every valve for marine service shall have the trade-mark of the manufacturer cast or stamped on the chamber. All such valves of 2 inches diameter and over shall be subjected by the manufacturer before shipment to a hydrostatic pressure of three and one-half times the working pressure which the manufacturer guarantees them to stand without distortion, and shall also be stamped with such working pressure and also the letters "M. S." which shall plainly indicate that the valve has met the test and requirements for marine service. All valves of over 2 inches diameter, without regard for the service for which they are intended, installed after April 30, 1917, shall have bolted bonnets. Valves of 2 inches diameter or less connected directly to the boiler shall be of cast steel, hard brass, or bronze. Screwed bonnets on cast-iron valves of any size or for any character of service are positively prohibited. On all boilers built after July 1, 1896, a stopcock or valve shall be placed between all check valves and boiler, and between all steam and water pipes and boiler: *Provided*, That this section shall not apply to safety valves that have been approved by the Board of Supervising Inspectors.

### PIPE FITTINGS.

The term "pipe fittings" refers to all hollow cylindrical fittings, and does not apply to flanges or valves.

All pipe fittings of more than 3 inches internal diameter shall be subjected by the manufacturer to a test of three and one-half times the pressure to which they will be subjected in service.

Where the thickness of the material in the boiler or drum, or the heads thereof, is not less than one-half inch, or where such boiler, drum, or head thereof has been reinforced by having a pad or flange riveted on the same, to make the thickness not less than one-half inch, pipes or fittings of 2 inches in diameter or under may be screwed directly into the same. Where steam or feed pipes of 2 inches in diameter or under are screwed into the boiler, the stop valve shall be connected to the boiler by as short a nipple as it is possible to use, nipples to be of extra-heavy thickness.

All boiler connections of over 2 inches in diameter, except the connections for safety valves, shall be permanently flanged and attached directly to the boiler by bolts, studs, or rivets.

Where the connecting point on the boiler is of circular form distance pieces shall be allowed in order to square the point of attachment of the flanged fittings.

Flanged distance pieces of not more than 8 inches between flanges may be allowed between stopcocks or valves and the boiler when necessary to care for and conveniently handle the valves when such distance pieces are constructed of wrought material of sufficient thickness and strength to withstand any pressure to which they may be subjected and securely riveted to the boiler.

Cast-steel flanged fittings, when conforming strictly with the requirements for steel castings, may be used for the purpose of connecting main and auxiliary stop valves and other steam outlets, including safety valves, distance from axis of outlets of such fittings to point of connection with boiler to be as short as practicable.

Valves and fittings of 3 inches and under may be connected by screw threads at their intermediate joints in pipe lines, but at point of connection with boiler all valves and fittings over 2 inches diameter shall be flanged and properly secured by bolts, studs, or rivets, and no fitting shall be of greater length than specified by the "Manufacturers' Standard."

Cast nozzles shall not be used when exposed to the direct action of the fire.

All sea valves or cocks secured to the skin of the vessel by bolts and connected to the engines or boilers by pipes shall be arranged so as to be accessible at all times, so that if a leak or defect occurs it can be reached. All parts of said valves except the chamber shall be made of brass or bronze when used on wooden-hull vessels navigating salt water; but in the case of vessels of iron or steel the brass or bronze bolts may be dispensed with.

### ALLOWABLE TEMPERATURES.

Cast iron, malleable iron, semisteel, and ferrosteel may be used in connection with temperatures up to and including 450° F.

Hard brass, bronze, and other compositions of which 95 per cent is copper, tin, and zinc may be used in connection with temperatures up to and including 470° F., but this temperature may be increased to 550° F. when the manufacturer of the valves or fittings stamps them with the temperature they are guaranteed to stand without disintegration. This paragraph will also apply to any composition meeting the above physical requirements and stamped in accordance therewith.

For all pressures exceeding 300 pounds per square inch or temperatures exceeding 550° F. no valves or fittings other than steel or of a composition whose tensile strength has been demonstrated to exceed 50,000 pounds per sectional square inch with an elongation of 10 per cent in a length of 2 inches shall be allowed. Such valves and fittings shall be stamped as above required.

The manufacturer of valves and fittings shall file with the Supervising Inspector General a certificate duly sworn to that all valves and fittings furnished by him for use on steam vessels comply with the requirements of the foregoing rule.

After July 1, 1911, local inspectors shall refuse to allow the use of any valves or fittings on steam vessels until notified by the Supervising Inspector General that such certificate is on file in his office. This shall not apply to valves and fittings installed previous to July 1, 1911.

### EVAPORATORS, FEED-WATER HEATERS, SEPARATORS, AND STEAM TRAPS MADE OF CAST IRON AND SUBJECT TO BOILER PRESSURE.

When evaporators, feed heaters, separators, and steam traps are constructed of cast iron possessing a tensile strength of not less than 20,000 pounds per square inch, the shells being cylindrical and ends flat or convex, the castings sound and of uniform thickness, the working pressure shall not exceed that found by the following formulas:

Flat surface:

$$P = \frac{20{,}000 \times T^2}{D^2}$$

$$T = \sqrt{\frac{P \times D^2}{20{,}000}}$$

Cylindrical shell:

$$P = \frac{3{,}500 \times T}{D}$$

$$T = \frac{P \times D}{3{,}500}$$

Where P = working pressure per square inch in pounds.
T = thickness in inches.

*Provided*, 1. That the thickness of ends of evaporators, feed heaters, and separators shall be not less than three-eighths of an inch. 2. That to the resultant thickness obtained by the formula given above there shall be added for cylinders having an inside diameter of 1 inch to 6 inches, inclusive, one-fourth of an inch; for cylinders having an inside diameter of over 6 inches to 15 inches, inclusive, one-eighth of an inch.

D = diameter inside in inches. When the pressure is to be determined for a part of a flat surface which is a square or rectangle in the flat surface formula, the value of D used shall be the diagonal of the square or rectangle, and when the ends are bolted to the shell the value of D used shall equal the diameter of the bolt circle.

All flanges shall be substantial, and there shall be a good fillet all around the root, and when the ends and shell are cast solid there shall be a good and substantial fillet inside all around.

The bolts or studs for the ends or doors shall not have a greater stress than 6,000 pounds per square inch, and the size of bolts or studs shall be not less than three-fourths of an inch in diameter.

### EVAPORATORS.

Evaporators shall be provided with an efficient safety valve of approved type set to blow at the maximum pressure to which the evaporator will be subjected in service, and it shall be the duty of the engineer in charge of the vessel to see that such valve blows off at least once in 30 days. (Sec. 4418, R. S.)

## OCEAN.

### Rule III.—Boats, Rafts, Bulkheads, and Life-saving Appliances.

### OCEAN STEAMERS.

1. Under this designation shall be included all steam vessels navigating the waters of any ocean or the Gulf of Mexico more than 20 nautical miles offshore.

For the purpose of apportioning lifeboat, life-raft, and davit equipment upon ocean steam vessels subject to the jurisdiction of the Steamboat Inspection Service, they shall be divided into the following classes:

(*a*) Passenger steam vessels.

(*b*) Passenger steam vessels the keels of which are laid after July 1, 1915.

(*c*) Cargo steam vessels and all other steam vessels navigating the waters of any ocean, unless hereinafter provided for.

### DAVITS REQUIRED.

2. Vessels of classes (*a*) and (*b*) shall be equipped with davits in accordance with the following table:

| Registered length of ship in feet. | Minimum number of sets of davits. | Minimum number of open boats of the first class. | Minimum capacity of lifeboats. |
|---|---|---|---|
| | | | *Cubic feet.* |
| 100 and less than 120 | 2 | 2 | 980 |
| 120 and less than 140 | 2 | 2 | 1,220 |
| 140 and less than 160 | 2 | 2 | 1,550 |
| 160 and less than 175 | 3 | 3 | 1,880 |
| 175 and less than 190 | 3 | 3 | 2,390 |
| 190 and less than 205 | 4 | 4 | 2,740 |
| 205 and less than 220 | 4 | 4 | 3,330 |
| 220 and less than 230 | 5 | 4 | 3,900 |
| 230 and less than 245 | 5 | 4 | 4,560 |
| 245 and less than 255 | 6 | 5 | 5,100 |
| 255 and less than 270 | 6 | 5 | 5,640 |
| 270 and less than 285 | 7 | 5 | 6,190 |
| 285 and less than 300 | 7 | 5 | 6,930 |
| 300 and less than 315 | 8 | 6 | 7,550 |
| 315 and less than 330 | 8 | 6 | 8,290 |
| 330 and less than 350 | 9 | 7 | 9,000 |
| 350 and less than 370 | 9 | 7 | 9,630 |
| 370 and less than 390 | 10 | 7 | 10,650 |
| 390 and less than 410 | 10 | 7 | 11,700 |
| 410 and less than 435 | 12 | 9 | 13,060 |

| Registered length of ship in feet. | Minimum number of sets of davits. | Minimum number of open boats of the first class. | Minimum capacity of lifeboats. |
|---|---|---|---|
| | | | *Cubic feet.* |
| 435 and less than 460 | 12 | 9 | 14,430 |
| 460 and less than 490 | 14 | 10 | 15,920 |
| 490 and less than 520 | 14 | 10 | 17,310 |
| 520 and less than 550 | 16 | 12 | 18,720 |
| 550 and less than 580 | 16 | 12 | 20,350 |
| 580 and less than 610 | 18 | 13 | 21,900 |
| 610 and less than 640 | 18 | 13 | 23,700 |
| 640 and less than 670 | 20 | 14 | 25,350 |
| 670 and less than 700 | 20 | 14 | 27,050 |
| 700 and less than 730 | 22 | 15 | 28,560 |
| 730 and less than 760 | 22 | 15 | 30,180 |
| 760 and less than 790 | 24 | 17 | 32,100 |
| 790 and less than 820 | 24 | 17 | 34,350 |
| 820 and less than 855 | 26 | 18 | 36,450 |
| 855 and less than 890 | 26 | 18 | 38,750 |
| 890 and less than 925 | 28 | 19 | 41,000 |
| 925 and less than 960 | 28 | 19 | 43,880 |
| 960 and less than 995 | 30 | 20 | 46,350 |
| 995 and less than 1,030 | 30 | 20 | 48,750 |

The minimum number of sets of davits is fixed in relation to the length of the vessel; provided that a number of sets of davits greater than the number of boats necessary for the accommodation of all the persons on board may not be required.

STRENGTH AND OPERATION OF THE DAVITS.

3. The davits shall be of such strength that the boats can be lowered with their full complement of persons and equipment, the vessel being assumed to have a list of 15 degrees.

The davits must be fitted with a gear of sufficient power to insure that the boat can be turned out against the maximum list under which the lowering of the boats is possible on the vessel in question.

The Secretary of Commerce is authorized by the seamen's act in specific cases to exempt existing vessels from the requirements of this section that the davits shall be of such strength and shall be fitted with a gear of sufficient power to insure that the boats can be lowered with their full complement of persons and equipment, the vessel being assumed to have a list of 15 degrees, where their strict application would not be practicable or reasonable.

Each set of davits shall have a boat of the first class attached to it, provided that the number of open boats of the first class attached to davits shall not be less than the minimum number fixed by the preceding table.

If it is neither practicable nor reasonable to place on a vessel the minimum number of sets of davits required, a smaller number of sets of davits may be fitted, provided always that this number shall never be less than the minimum number of open boats of the first class required by the table. If a large proportion of the persons on board is accommodated in boats whose length is greater than 50 feet, a further reduction in the number of sets of davits may be allowed exceptionally, if the arrangements are in all respects satisfactory. *Provided, however,* That in all cases in which a reduction in the minimum number of sets of davits or other equivalent appliances required by the rules is allowed, the owner of the vessel in question shall be

required to prove, by a test made in the presence of an officer designated by the Supervising Inspector General, that all the boats can be efficiently launched in a minimum time.

The conditions of this test shall be as follows:

First. The vessel is to be upright and in smooth water.

Second. The time is to be the time required from the beginning of the removal of the boat covers, or any other operation necessary to prepare the boats for lowering, until the last boat or pontoon raft is afloat.

Third. The number of men employed in the whole operation must not exceed the total number of boat hands that will be carried on the vessel under normal service conditions.

Fourth. Each boat when being lowered must have on board at least two men and its full equipment as required by the rules.

Fifth. The time allowed for this test shall not exceed 10 minutes.

Vessels of class (*c*) shall be equipped with davits or other practicable means for properly launching the lifeboats.

On and after May 1, 1920, the complete installation of all mechanical boat davits shall be tested and demonstrated for strength and efficiency at the place of manufacture in the presence of an inspector of the Steamboat Inspection Service.

The frame, gear, worms, arms, and all machinery in connection with the operation of the device shall be set up in the shop in the same manner as when installed for use on board the ship and shall be tested in the following manner: A weight equal to the weight of the boat with its equipment and complement of persons that the davit is intended to serve, the weight of the persons being considered as 140 pounds each, shall be suspended from the eye or end of each davit arm, and while the weight is in suspension, the davit arm shall be operated from the inboard position to the full outboard position with the same operating crank or device that is used in actual practice on board the ship. Under this test the davit arm shall show no permanent set or deflection, and the frame, gear, and operating mechanism shall show no distress or distortion. While this test is being conducted, the frame, gear, and operating mechanism, if of cast material, shall be subjected to a test by being well hammered, to satisfy the inspector that the castings are sound and without flaw.

When the assembled installation meets the foregoing requirements and the inspector is satsified that the device is sufficient in strength and operation, he shall stamp the davit arm and the frame to which it is attached, which shall bear identical numbers of the manufacturer, with the letters "U. S. I.," the initials of his name, and a serial number.

When steel castings are employed for frames or davit arms, the castings shall be thoroughly annealed, and the tensile strength of the castings shall be not less than 58,000 pounds nor more than 78,000 pounds per square inch, with an elongation of not less than 20 per cent in a length of $2\frac{1}{2}$ inches measured on the test piece used in determining the tensile stress. The test piece shall have a section $2\frac{1}{2}$ inches in the center turned down to one-half inch diameter. An inspector of this service shall witness this test. Sample pieces must be a part of the annealed casting and must represent the casting after it has been thoroughly annealed, and if the casting has afterwards been heated for any purpose it shall be again annealed. The manufacturer

shall furnish the inspector, when required, an affidavit setting forth the fact that the required tests respecting annealing have been fully complied with. The davit arm, if of cast material, shall be raised to an angle of 45°, the lower end resting upon the ground, and dropped on a hard unyielding base, and then slung up and subjected to a test by being well hammered with a sledge hammer not less than 7 pounds in weight, to satisfy the inspector that the casting is sound and without flaw. An inspector of the Steamboat Inspection Service shall be present at the foundry where such castings are made, and when the foregoing specifications and tests referred to in this paragraph have been complied with to his satisfaction, he shall stamp the davit arm and the davit frame with the letters "U. S. I.," the initials of his name, and the letters "F. T." indicating that the foundry tests have been complied with.

No davit arm or frame comprising mechanical davits shall be placed on board any vessel until all these requirements have been fully complied with.

After October 31, 1926, all cast-steel mechanical davits carried in stock, which have not been tested as above described, shall be subjected to the drop, hammer, suspension, and turning-out tests, and stamped by an inspector, all as above described, before such davits are accepted as lawful equipment. (Secs. 4405, 4488, R. S.)

### LIFEBOATS REQUIRED.

#### VESSELS OF CLASSES (*a*) AND (*b*).

4. *Vessels of classes* (*a*) *and* (*b*) shall be equipped with lifeboats in accordance with the preceding table, provided that such vessels shall not be required to carry more lifeboat capacity than is necessary to accommodate all persons on board.

If the lifeboats attached to davits do not provide accommodations for the vessel's actual complement of passengers and crew, additional lifeboats of one of the standard types shall be installed to accommodate all persons on board, or to bring the complement of lifeboat capacity up to the minimum provided by the table, or to 75 per cent of the complement of people on board, whichever is the greater.

The remainder of the required equipment shall be provided by lifeboats of one of the standard types or approved life rafts.

#### MOTOR-PROPELLED LIFEBOATS ON STEAMERS.

5. All ocean steam vessels of more than 2,500 gross tons carrying passengers, whose route at any point lies more than 200 miles offshore, shall carry at least one motor-propelled lifeboat as a part of their required lifeboat equipment: *Provided*, That any vessel under the jurisdiction of the Steamboat Inspection Service may carry one motor-propelled lifeboat as a part of the required lifeboat equipment, but on vessels carrying more than six lifeboats under davits, two of such lifeboats may be motor propelled.

The engine for such motor-propelled lifeboats shall be of a reliable internal-combustion type, and shall be substantially and permanently installed inside the boat. It shall be of sufficient power to propel the boat when loaded to its full capacity at a speed of at least 5 miles per hour in smooth water without favorable current, and

shall have an endurance of at least 24 hours under the above conditions.

The motor shall be protected by a water-tight inclosure, the top of which shall be fitted so that it may be removed when necessary, and there shall be fitted in the top a mushroom ventilator.

The motor of each lifeboat shall be operated under service conditions ahead and astern for a period of not less than five minutes once at least in every seven days in order that it may be ready for service at any time. Such operation shall be a part of the lifeboat drill, and the fact of such operation shall be made a part of the report of such drill.

All fittings, pipes, and connections shall be of the highest standard and best workmanship and in accordance with the best modern practice.

The fuel for such motors shall be contained in substantial tanks of seamless steel, welded steel, or copper, securely and firmly fitted in the lifeboat and located where the greatest safety will be secured, and the storage of fuel other than in the lifeboat using it is prohibited.

In computing the cubical capacity of motor-propelled lifeboats the space required for the motor and fuel shall be excluded, and in fixing the air-tank requirements the weight of the motor and its accessories shall be carefully considered in the calculation and allowance made for the extra bouyancy required for such weights. (Secs. 4405, 4488, R. S.)

LIFEBOATS REQUIRED ON VESSELS OF CLASS (*c*).

6. *Vessels of class* (*c*), except cargo vessels hereafter provided for, shall carry sufficient lifeboats to accommodate all persons on board: *Provided*, That vessels engaged exclusively in the business of purse seining may use their wooden seine boats as lifeboats; vessels engaged exclusively in the business of wrecking may use their wooden surf boats as lifeboats; and vessels engaged exclusively in the business of hook-and-line fishing from dories may use their dories as lifeboats: *Provided*, That the dories are fitted with air tanks of sufficient capacity to meet the rule for necessary air-tank equipment.

Cargo vessels shall carry a sufficient number of lifeboats on each side to accommodate all persons on board.

CARRYING OF LIFEBOATS ON VESSELS OF CLASSES (*a*) AND (*b*).

7. All vessels of classes (*a*) and (*b*) except those fitted with mechanical davits, shall, when the weather permits, have one of their lifeboats swung out on each side while at sea, brailed into a boom or rail, and ready for immediate use.

LIFEBOATS REQUIRED ON INSPECTED MOTOR VESSELS.

8. All vessels propelled by machinery other than steam, subject to the inspection laws of the United States, shall be required to have the same lifeboat and life-raft equipment as steamers of the same class, and local inspectors shall so indicate in the certificate of inspection.

Motor vessels under 50 tons, when navigating in daylight only, and when equipped with air tanks under deck of sufficient capacity to sustain afloat the vessel when full of water with her full complement of passengers and crew, or when properly subdivided by iron or

steel water-tight bulkheads of sufficient strength and so arranged and located that the vessel will remain afloat with her full complement of passengers and crew with any two compartments open to the sea, shall be required to have not less than 100 cubic feet of lifeboat capacity. (Sec. 4426, R. S.)

LIFEBOATS AND OTHER EQUIPMENT REQUIRED ON SAIL VESSELS.

9. Sail vessels carrying passengers on the ocean under the provisions of section 4417, Revised Statutes, as amended by the act of Congress approved March 3, 1905, shall be subject to the same requirements for lifeboat capacity as ocean steamers of the same class, and in addition thereto they shall be equipped with a life preserver for each and every person on board.

LIFEBOATS AND THEIR EQUIPMENT REQUIRED ON SEAGOING BARGES OF 100 GROSS TONS OR OVER.

10. The lifeboats required on seagoing barges of 100 gross tons or over shall be at least 14 feet long and equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight.

At least two life preservers.

One painter of manila rope of not less than $2\frac{3}{4}$ inches in circumference and of suitable length.

Four oars of suitable length for size of boat.

Not less than four rowlocks attached to the boat with chains.

One boat hook attached to a staff of suitable length.

One bucket.

On wooden boats there shall be two plugs secured with chains for each drain hole.

EQUIPMENT FOR LIFEBOATS.

11. All lifeboats on ocean steam vessels shall be equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope, and the seine float in each bight shall hang to within 12 inches of the surface of the water when the boat is light.

One painter of manila rope of not less than $2\frac{3}{4}$ inches in circumference and of suitable length.

A full complement of oars and two spare oars.

One set and a half of thole pins or rowlocks attached to the boat with separate chains.

One steering oar with rowlock or becket and one rudder with tiller or yoke and yoke lines. In boats of special construction where a rudder is difficult of installation, it may be dispensed with.

One boat hook attached to a staff of suitable length.

Two life preservers.

Two hatchets.

One galvanized-iron bucket with lanyard attached.

One bailer.

Where automatic plugs are not provided there shall be two plugs secured with chains for each drain hole.

One efficient liquid compass with not less than a 2-inch card.

One lantern containing sufficient oil to burn at least nine hours and ready for immediate use.

One can containing 1 gallon of illuminating oil.

One box of friction matches wrapped in a waterproof package and carried in a box secured to the underside of the stern thwart.

A wooden breaker or suitable tank fitted with a siphon, pump, or spigot for drawing water, and containing at least 1 quart of water for each person.

Two enameled drinking cups.

A water-tight receptacle containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal, fitted with an opening in the top not less than 5 inches in diameter, properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

The United States Army ration above referred to may be any emergency ration of cereal or vegetable compound approved or used by the Army or Navy, but no ration of meat or any ration requiring saline preservative shall be allowed.

One canvas bag containing sailmaker's palm and needles, sail twine, marline, and marline spike.

A water-tight metal case containing 12 self-igniting red lights capable of burning at least two minutes: *Provided*, That one standard 3-cell focusing flash light and 3 extra standard batteries contained in a portable water-tight metal case may be substituted for 6 of the required 12 self-igniting red lights.

A sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water and so arranged that it can be attached to the sea anchor.

A mast or masts with one good sail at least and proper gear for each (this does not apply to motor lifeboats), the sail and gear to be protected by a suitable canvas cover. In case of a steam vessel which carries passengers in the North Atlantic and is provided with a radiotelegraph installation, all the lifeboats need not be equipped with masts and sails. In this case at least one of the boats on each side shall be so equipped.

All loose equipment must be securely attached to the boat to which it belongs.

Lifeboats of less than 180 cubic feet capacity on pleasure steamers are not required to be equipped as above.

### STANDARD TYPES OF BOATS.

12. *The standard types of boats classified as follows:*

| Class. | Section. | Type. |
|---|---|---|
| I. Entirely rigid sides | A. Open | Internal buoyancy only. |
| | B. Open | Internal and external buoyancy. |
| | C. Pontoon | Well deck; fixed water-tight bulwarks. |
| II. Partially collapsible sides | A. Open | Upper part of sides collapsible. |
| | B. Pontoon | Well deck; collapsible water-tight bulwarks. |
| | C. Pontoon | Flush deck; collapsible water-tight bulwarks. |

DRAWINGS, SPECIFICATIONS, NAME PLATE.

13. All *lifeboats* shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the lifeboats are built.

Builders of lifeboats shall furnish the supervising inspector of the district in which the lifeboats are built drawings, or blue prints, and specifications showing and explaining the construction of same, and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation in a length of 4 inches of at least 20 per cent when the thickness of the metal is of, or greater than, No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of lifeboats shall affix a plate or other device to each lifeboat, having thereon the builder's name, number of boat, date of construction of boat, cubical contents of boat, and number of persons said boat will carry, as determined by the rules of the Board of Supervising Inspectors. (Secs. 4405, 4488, R. S.)

INSPECTION OF LIFEBOATS WHEN BUILT.

14. Supervising inspectors of districts where lifeboats are built shall detail an assistant or local inspector to any place where lifeboats are being built, whose duty it shall be to carefully inspect and examine the construction of such lifeboats, and he shall satisfy himself that such lifeboats are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the boat, he shall stamp his initials, together with the letters "U. S. I.," on a blank space on the plate required to be affixed to the boat by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the boat has been constructed in accordance with the drawings, or blue prints, and specifications on file. (Secs. 4405, 4488, R. S.)

BOATS OF THE FIRST CLASS.

CONSTRUCTION OF METALLIC LIFEBOATS OF CLASS 1A.

15. All metallic lifeboats of class 1A shall be constructed in accordance with following specifications:

*The keels, stems, sternposts, gunwales, and nosings* shall be of clear-grain, sound oak or other suitable wood, each in one length, except that the gunwales and nosings may be made in two lengths. When made in two lengths, the gunwales shall be scarfed with a good long bevel scarf stiffened on the underside by a piece of gunwale material at least 2 feet in length, 1½ inches thick, and the width of the gunwale.

The *stem* of each boat shall be of a natural or steam crook, scarfed at least 9 inches in length on the keel and fastened thereto with two ⅜-inch through clinch bolts driven through deadwood fitted on the inside.

Each *sternpost* shall be stepped over the end of the keel half the length of sternpost and recessed at least 2½ inches deep into keel, the whole to be secured on the inside by a crook or knee of sufficient width to receive the flanges of the shell plates.

Each joint of the stem and sternpost shall be fitted with two $\frac{3}{8}$-inch *stopwaters* under the shell flanges. Stem and sternpost shall be bearded to not less than $1\frac{1}{2}$ inches.

The *flanges of shell plates* on boats not over 20 feet long shall lap on the keel, stem, and sternpost at least $2\frac{1}{4}$ inches; on boats over 20 feet and not over 24 feet long, at least $2\frac{1}{2}$ inches; and on boats over 24 feet long, at least $2\frac{3}{4}$ inches, to be fairly drawn up and nailed over a strip of No. 6 cotton duck the width of the flanges, which shall be secured by three rows of galvanized nails driven zigzag. No part of the keel, stem, or sternpost outside of the shell flanges shall be covered with sheet metal.

In boats not over 20 feet long the *nails* shall be driven zigzag on lines $\frac{3}{8}$, $1\frac{1}{8}$, and $1\frac{7}{8}$ inches, respectively, from the edge of the flanges and pitched $1\frac{3}{4}$ inches. In boats over 20 feet and not over 24 feet long the nails shall be driven on lines $\frac{3}{8}$, $1\frac{1}{4}$, and $2\frac{1}{8}$ inches, respectively, from the edge of the flanges and pitched $1\frac{5}{8}$ inches. In boats over 24 feet long the nails shall be driven on lines $\frac{3}{8}$, $1\frac{3}{8}$, and $2\frac{3}{8}$ inches, respectively, from the edge of the flanges, and pitched $1\frac{1}{2}$ inches.

In boats not over 20 feet long the nails shall be not less than $1\frac{3}{4}$ inches long, No. 10 B. W. G. In boats over 20 feet and not over 24 feet long the nails shall be not less than 2 inches long, No. 10 B. W. G. In boats over 24 feet long the nails shall be not less than $2\frac{1}{2}$ inches long, No. 9 B. W. G.

Metallic lifeboats of a length not over 20 feet shall be constructed of *plates* of not less thickness than No. 18 B. W. G. Boats over 20 feet and not over 24 feet long shall be constructed of plates of not less thickness than No. 16 B. W. G. Boats longer than 24 feet shall be constructed of plates of not less thickness than No. 14 B. W. G.

All *seams and joints* shall be properly double riveted. The seams and butt laps shall lap at least $1\frac{1}{4}$ inches.

The center of the row of *rivets* nearest the edge of a sheet shall be about three-eighths of an inch from the edge. Rivets shall be staggered with not less than 18 rivets to the foot, and shall have countersunk heads. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

*The keels, stems, and sternposts shall be not less than the following sizes:*

| Length of boat. | Width of keel, stem, and stern-post. | Depth of keel, stem, and stern-post. |
|---|---|---|
| | *Inches.* | *Inches.* |
| Not over 18 feet | 1.8 | 4.0 |
| Over 18 and not over 20 feet | 2.0 | 5.0 |
| Over 20 and not over 21 feet | 2.1 | 5.0 |
| Over 21 and not over 22 feet | 2.2 | 5.0 |
| Over 22 and not over 23 feet | 2.3 | 5.0 |
| Over 23 and not over 24 feet | 2.4 | 5.0 |
| Over 24 and not over 25 feet | 2.5 | 5.0 |
| Over 25 and not over 26 feet | 2.6 | 5.0 |
| Over 26 and not over 27 feet | 2.7 | 5.0 |
| Over 27 and not over 28 feet | 2.8 | 5.0 |

The keels of all boats over 26 feet long shall be strengthened by the addition of a main *keelson* extending not less than two-thirds the length of the boat and having one-half the area of the main keel, to which it shall be through fastened with $\frac{3}{8}$-inch clinch bolts spaced not more than 14 inches.

Steel having one-sixth the sectional area of wood found by the above table may be used in lieu of wood for keels, stems, and sternposts of metallic lifeboats.

All steel keels, stems, and sternposts shall be painted with two coats of red lead and oil.

The shell plates shall be riveted to the steel keels, stems, and sternposts with button-head rivets of not less than $\frac{3}{16}$ inch in diameter for boats less than 24 feet in length, not less than $\frac{1}{4}$ inch in diameter for boats of 24 feet up to and including 27 feet in length, and not less than $\frac{5}{16}$ inch in diameter for boats from 28 feet up to and including 30 feet in length.

The rivets shall be staggered not less than 12 rivets to the foot.

The shell plating attached to the steel keels, stems, and sternposts shall be laid over flannel or felt and red lead to insure water-tightness. Any form of joint insuring the same result may be approved by the supervising inspector of the district in which the lifeboat is built.

*The size of gunwales shall be of not less than the following dimensions:*

| Length of boat. | Depth of gunwale. | Width of gunwale. |
|---|---|---|
| | *Inches.* | *Inches.* |
| Not over 18 feet | $1\frac{3}{4}$ | 2 |
| Over 18 and not over 20 feet | $1\frac{7}{8}$ | $2\frac{1}{8}$ |
| Over 20 and not over 22 feet | 2 | $2\frac{1}{4}$ |
| Over 22 and not over 24 feet | $2\frac{1}{8}$ | $2\frac{3}{8}$ |
| Over 24 and not over 26 feet | $2\frac{1}{4}$ | $2\frac{1}{2}$ |
| Over 26 and not over 28 feet | $2\frac{3}{8}$ | $2\frac{5}{8}$ |

The gunwales of boats not over 22 feet long shall be attached to the thwarts by steel *braces* at least $1\frac{1}{4}$ inches wide by five-sixteenths of an inch thick, teed 4 inches on the thwarts and secured thereto by two $\frac{1}{4}$-inch carriage bolts, and to the gunwales by a $\frac{1}{4}$-inch bolt clinched over the plate on the outside. In boats over 22 feet long such steel braces shall be at least $1\frac{1}{2}$ inches by three-eighths of an inch, teed 5 inches on the thwarts and secured thereto by three $\frac{1}{4}$-inch carriage bolts, and to the gunwales by $\frac{5}{16}$-inch bolts clinched over the plate on the outside. All sheer plates shall come up on the gunwale to within one-half inch of its top and be nailed thereto with $1\frac{1}{2}$-inch boat nails spaced 6 inches.

Angle-bar steel gunwales may be used for all lifeboats when the cross-sectional area of the same is of at least one-sixth the cross-sectional area of the wooden gunwale as now specified and required, subject to the suspension test required of lifeboat when loaded with its full complement of persons and equipment.

All *nosings* shall be formed of so-called half rounds, mitered to fit fairly against the gunwales and sheer plates, through which they shall be nailed to the gunwales every 6 inches with wire nails of No. 10 gauge and not less than $2\frac{3}{4}$ inches long. The flat side of nosings on boats of not over 20 feet long shall be not less than $1\frac{3}{8}$ inches wide and five-eighths of an inch thick. On boats over 20 feet and not over 24 feet long the flat side of the nosing shall be not less than $1\frac{7}{8}$ inches wide and 1 inch thick through the round. On all boats over 24 feet long the flat side of the nosing shall be not less than $2\frac{1}{4}$ inches wide and 1 inch thick through the round.

All *thwarts* shall be made of clear yellow pine or fir.

In boats not over 20 feet long thwarts shall be at least 1⅛ inches thick by 7½ inches wide. In boats over 20 feet and not over 24 feet long they shall be at least 1¼ inches thick by 8 inches wide. In boats over 24 feet long they shall be 1⅜ inches thick by 9 inches wide. All thwarts over 4½ feet long shall be supported by *stanchions* of pine of 1 inch by 5 inches. Every thwart shall be secured at each end to the boat by a double or U flange of No. 16 plate riveted to the shell with five rivets. The thwarts shall be pushed in between those flanges and secured thereto by five boat nails driven down through the upper flanges, thwarts, and lower flanges, and turned over beneath.

*Breasthooks formed of steel* for boats not over 20 feet long shall be one-fourth inch thick and 1¼ inches wide. In boats over 20 feet and not over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1⅜ inches wide. In boats over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1½ inches wide.

No breasthooks shall be less than 9 inches long.

Breasthooks shall be fastened through the gunwales each side with three one-fourth inch button-head bolts clinched over the shell plate. All such breasthooks shall be upset in the throat sufficient to allow the upper bolt through the ring strap to pass through the hook without reducing the sectional area thereof.

The *midship footings* in boats not over 18 feet long shall be not less than seven-eighths of an inch thick and have two footings on each side, which footings shall be seven-eighths of an inch thick by 7 and 5 inches wide, respectively. The midship footings in boats over 18 feet and not over 24 feet long shall be not less than 1 inch thick by 12 inches wide and have three footings on each side, which shall be 1 inch thick by 7, 6, and 4 inches, respectively, in width. The midship footings in boats over 24 feet and not over 26 feet long shall be not less than 1 inch thick and 12 inches wide, and such boats shall have not less than three footings on each side, each to be not less than 1 inch thick by 7, 6, and 4½ inches, respectively, in width. Boats over 26 feet long having a keelson shall have three footings on each side 1 inch thick by 8, 6, and 5 inches, respectively, in width. All said footings shall be fitted fairly to the bottom over a coat of lead paint and held in place by straps of No. 18 plate, 1⅛ inches wide, riveted with four rivets to the boat shell. The strap shall pass up through an aperture in the middle of each footing and receive a toggle of gas pipe five-eighths of an inch in diameter and of a length not less than two-thirds of the width of the footing. There shall be not less than four such toggles in each footing in boats not over 20 feet long, nor less than five such toggles in boats over 20 feet and not over 24 feet long. In boats over 24 feet long there shall be six such toggles in each footing. The midship footings shall be secured to the bottom by straps and toggles in two rows placed 3 inches from each edge of the footing, and fastened with toggles of one-half-inch pipe 3½ inches long. Hardwood toggles may be used in lieu of pipe when the same are formed of oak of so-called half rounds, 1 inch on their flat side and three-fourths of an inch thick. Iron or steel of so-called half round not less than five-eighths of an inch on the flat side and not less than three-sixteenths of an inch thick may also be used for toggles.

The *tackle rings* in boats not over 18 feet long shall be formed of not less than ⅝-inch round steel. In boats over 18 feet and not over 22 feet long such rings shall be formed of not less than ¾-inch round

steel. In boats over 22 feet and not over 26 feet long such rings shall be formed of not less than $\frac{13}{16}$-inch round steel. In boats over 26 feet long such rings shall be formed of not less than $\frac{7}{8}$-inch round steel. Such rings shall be welded through eyes of equal strength in the ring straps, which straps shall have a sectional area on each side of the upper bolt hole equal to that of the ring, and the sectional area of strap on each side of the next bolt hole shall be two-thirds that of such ring, and on each side of the next row of bolt holes one-half that of such ring. *Hooks* may be allowed in lieu of rings when constructed of equal strength to rings and attached to the boat as securely as the rule provides for rings.

The pitch of bolt holes in all such straps shall be 3 inches.

In boats not over 18 feet long said ring straps shall be secured with three bolts $\frac{1}{2}$ inch in diameter. In boats over 18 feet and not over 22 feet in length such ring straps shall be secured by three bolts $\frac{5}{8}$ inch in diameter. In boats over 22 feet and not over 26 feet long such ring straps shall be secured by four bolts $\frac{5}{8}$ inch in diameter. In boats over 26 feet long such ring straps shall be secured by five bolts, the upper two of which shall be $\frac{5}{8}$ inch in diameter and the other three $\frac{9}{16}$ inch in diameter. The two upper bolts shall be driven through and clinched on the outer edge of the stem and sternpost. The lower bolt or bolts may be driven blunt $3\frac{1}{2}$ inches into the stem and sternpost. The upper bolts shall pass through the breasthooks.

Each and every lifeboat shall be fitted with a *painter ring* properly secured, of a size and strength not less than that specified for tackle rings.

All boats shall have a *mean sheer* of at least 4 per cent of the length. This paragraph shall not apply to lifeboats constructed prior to November 4, 1915.

All boats shall be fitted with *rudders* made of clear, straight-grained oak or fir, which shall be stiffened across the bottom edge by a piece of wood of the same character, properly nailed.

All gudgeons and pintles shall be strapped to the wood and through fastened, and be so adjusted that the lower pintle will project at least $1\frac{1}{2}$ inches more below its gudgeon than does the upper one.

Each lifeboat shall be fitted with an *automatic plug*.

All the shell plates, air tanks, nails, gunwale braces, rudder braces, and fastenings of metallic boats shall be *galvanized* when said parts are made of steel or iron.

The *gauge numbers* referred to in Rule III are the Birmingham standard (B. W. G.). (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF WOODEN LIFEBOATS.

16. Wooden lifeboats shall be substantially constructed and in every way equal in strength and stability to a metallic boat built in accordance with the above specifications. (Sec. 4488, R. S.)

1B. OPEN BOATS WITH INTERNAL AND EXTERNAL BUOYANCY.

17. The internal buoyancy of a wooden boat of this type shall be provided by water-tight air cases, the total volume of which is at least equal to $7\frac{1}{2}$ per cent of the cubic capacity of the boat.

The external buoyancy may be of cork or of any other equally efficient material, but such buoyancy shall not be secured by the use of rushes, cork shavings, loose granulated cork, or any other loose

granulated substance, or by any means dependent upon inflation by air.

If the buoyancy is of cork, its volume, for a wooden boat, shall not be less than thirty-three thousandths of the cubic capacity of the boat; if of any material other than cork, its volume and distribution shall be such that the buoyancy and stability of the boat are not less than that of a similar boat provided with buoyancy of cork.

The buoyancy of a metal boat shall be not less than that required above for a wooden boat of the same cubic capacity, the volume of the air cases and external buoyancy being increased accordingly.

Boats of this class shall have a mean sheer equal to at least 4 per cent of their length.

LUNDIN LIFEBOATS.

18. *Lundin decked lifeboats* shall be accepted as equivalent to Class 1A lifeboats and shall be rated and accepted as lifeboats under davits, and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic foot}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

*Example.*

28 feet × 9.5 feet × 2.5 feet × 0.9 = 598.5 cubic feet.

Allow 10 cubic feet to a person, 598.5 ÷ 10 = 59 persons.

*Provided,* That when the Lundin decked lifeboat is loaded to its full capacity the water-tight deck shall be not less than 2 inches above the load water line, and shall have an excess buoyancy in air space and fenders of not less than 25 per cent of the combined weight of boat and load. Not less than 10 per cent of the total buoyancy shall be in fenders of buoyant material firmly secured to the outside of the boat.

The following example is given in explanation of the above proviso:

*Example.*

26 feet, 50 persons, Lundin decked lifeboat.

Height of load water line, 15 inches. Required height of inner deck = 15 inches + 2 inches = 17 inches. Combined weight of boat and load (each person allowed figured at 165 pounds), 12,250 pounds. Excess buoyancy required in air space and fenders above = 0.25 × 12,250 = 3,062.5 pounds. Total buoyancy required, i. e., buoyancy of air space below water-tight deck plus buoyancy of entire fenders, = 12,250 + 3,062.5 = 15,312.5 pounds. Buoyancy required in entire fenders = 0.10 × 15,312.5 = 1,531.25 pounds.

The carrying capacity of the Lundin *power* lifeboat shall be determined by the same rule as the Lundin decked lifeboat, with proper reduction for the weight and space used for the motors, tanks for fuel, and wireless apparatus.

The carrying capacity of the Lundin *housed* lifeboat shall be determined by the same rule as the Lundin decked lifeboat.

*Lundin semidecked lifeboats* shall be accepted as equivalent to Class 1A lifeboats and shall be rated and accepted as lifeboats under davits, and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations, and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic foot}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

*Example.*

20 feet × 7 feet × 2 feet × 0.9 = 252 cubic feet.
Allowing 10 cubic feet to a person, 252 ÷ 10 = 25 persons.

*Provided*, That the length of the Lundin semidecked lifeboat does not exceed 24 feet; that the above boat is provided with independent air tanks, placed at the sides of the boat, built in accordance with the general rules for air tanks of lifeboats and with a capacity of not less than 1½ cubic feet for each person allowed; that the above boat is provided with built-in water-tight compartments, one in each end, and provided with a water-tight manhole, and that not less than 10 per cent of the volume of the displacement to the load-water line shall be in fenders of buoyant material firmly secured to the outside of the boat.

The Lundin *open* lifeboat with balsa-wood fenders, 24 feet in length, 7 feet 1 inch in breadth inside fender, 8 feet in breadth outside fender, and 3 feet 2 inches in depth, shall be allowed to carry 40 persons. The number of persons allowed to be carried on boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

BOATS EQUIVALENT TO BOATS OF CLASS 1B.

19. Any type of boat may be accepted as equivalent to a boat of class 1B after blue prints and specifications have been submitted and a practical demonstration of a full-size boat is witnessed by the Board of Supervising Inspectors.

1C. PONTOON BOATS, IN WHICH PERSONS CAN NOT BE ACCOMMODATED BELOW THE DECK, HAVING A WELL DECK AND FIXED WATER-TIGHT BULWARKS.

20. The area of a well deck of a boat of this type shall be at least 30 per cent of the total deck area. The height of the well deck above the water line at all points shall be at least equal to one-half per cent of the length of the boat, this height being increased to 1½ per cent of the length of the boat at the ends of the well.

The freeboard of a boat of this type shall be such as to provide for a reserve buoyancy of at least 35 per cent.

## BOATS OF THE SECOND CLASS.

21. The standard types of boats of the second class must satisfy the following conditions:

### 2A. OPEN BOATS HAVING THE UPPER PART OF THE SIDES COLLAPSIBLE.

22. A boat of this type shall be fitted both with water-tight air cases and with external buoyancy, the volume of which, for each person which the boat is able to accommodate, shall be at least equal to the following amounts: Air cases, $1\frac{5}{10}$ cubic feet; external buoyancy (if of cork), $\frac{2}{10}$ cubic foot.

The minimum freeboard of boats of this type is fixed in relation to their length; it is measured vertically to the top of the solid hull at the side amidships, from the water level when the boat is loaded.

The freeboard in fresh water shall not be less than the following amounts:

| Length of the boat. | Minimum. freeboard. |
|---|---|
| *Feet.* | *Inches.* |
| 26 | 8 |
| 28 | 9 |
| 30 | 10 |

The freeboard of boats of intermediate lengths is to be found by interpolation.

### 2B. PONTOON BOATS HAVING A WELL DECK AND COLLAPSIBLE BULWARKS.

23. All the conditions laid down for boats of type 1C are to be applied to boats of this type, which differ from those of type 1C only in regard to the bulwarks.

### 2C. PONTOON BOATS, IN WHICH THE PERSONS CAN NOT BE ACCOMMODATED BELOW DECK, HAVING A FLUSH DECK AND COLLAPSIBLE BULWARKS.

24. The minimum freeboard of boats of this type is independent of their lengths and depends only upon their depth. The depth of the boat is to be measured vertically from the underside of the garboard strake to the top of the deck at the side amidships, and the freeboard is to be measured from the top of the deck at the side amidships to the water level when the boat is loaded.

The freeboard in fresh water shall not be less than the following amounts, which are applicable without correction to boats having a mean sheer equal to 3 per cent of their length:

| Depth of boat. | Minimum. freeboard. |
|---|---|
| *Inches.* | *Inches.* |
| 12 | $2\frac{3}{4}$ |
| 18 | $3\frac{3}{4}$ |
| 20 | $5\frac{1}{8}$ |
| 30 | $6\frac{1}{2}$ |

For intermediate depths the freeboard is obtained by interpolation.

If the sheer is less than the standard sheer defined above, the minimum freeboard is obtained by adding to the figures in the table

one-seventh of the difference between the standard sheer and the actual mean sheer measured at the stem and sternpost. No deduction is to be made from the freeboard on account of the sheer being greater than the standard sheer or on account of the camber of the deck.

Pontoon lifeboats may be built of wood or metal. If constructed of wood, they shall have the bottom and deck made of two thicknesses with textile material between; if of metal, they shall be divided into water-tight compartments, with means of access to each compartment.

ARRANGEMENTS FOR CLEARING PONTOON LIFEBOATS OF WATER.

25. All pontoon lifeboats shall be fitted with efficient means for quickly clearing the deck of water. The orifices for this purpose shall be such that the water can not enter the boat through them when they are intermittingly submerged. The number and size of the orifices shall be determined for each type of boat by a special test.

For the purpose of this test the pontoon boat shall be loaded with a weight of iron or bags of sand equal to that of its complement of persons and equipment.

In the case of a boat 28 feet in length, 2 tons of water shall be cleared from the boat in a time not exceeding the following: Type 1C, 60 seconds; type 2B, 60 seconds; type 2C, 20 seconds.

TYPE OF BOAT EQUIVALENT TO BOAT OF CLASS II.

26. Any type of boat may be accepted as equivalent to a boat of class II after blue prints and specifications have been submitted to, and a practical demonstration of a full-size boat has been witnessed by, and the type of boat has been approved by, the Board of Supervising Inspectors.

BRUDE LIFEBOAT.

27. Lifeboats of the Brude type, of the sizes specified below, for use on cargo steamers, shall be allowed the following rating:

| Length. | Height. | Width. | Number of persons carried and allowed on cargo steamers. |
|---|---|---|---|
| *Feet.* | *Ft. in.* | *Ft. in.* | |
| 18 | 8 0 | 8 0 | 34 |
| 14 | 6 9 | 6 9 | 17 |

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

CAPACITY AND ALLOWANCE OF ENGELHARDT COLLAPSIBLE LIFEBOATS.

28. Engelhardt collapsible lifeboats may be carried as lifeboats and rated as class 2C, and shall be fully equipped as lifeboats as required by these rules.

The cubic capacity of Engelhardt collapsible lifeboats shall be determined in accordance with the following rule: Measure in feet and fractions of a foot the length and breadth outside of canvas extension and the depth inside at the place of minimum depth taken from the inside of the bottom planking of the bottom to the top of gunwale when extended. The product of these dimensions multiplied by 0.7 shall be deemed the capacity in cubic feet. (Sec. 4488, R. S.)

NEWCOMB INCLOSED LIFEBOAT.

29. Lifeboat of this type, 26 feet in length, 6 feet 4 inches in breadth, and 3 feet 4 inches in depth, when constructed in accordance with the rules for lifeboats, shall be allowed to carry 25 persons. The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

AIR TANKS OF LIFEBOATS.

30. All lifeboats contracted for after September 30, 1912, shall have not more than 50 per cent of the air-tank capacity in the ends of the boat and the remaining capacity shall be located in the side tanks.

After June 20, 1912, the air tanks of all lifeboats shall be entirely independent of the hull or other construction and shall be of suitable noncorrosive material and of a capacity of not less than 1.5 cubic feet for each person allowed in metallic boats and not less than 1 cubic foot for each person allowed in wooden boats. Such air tanks shall be firmly and securely fastened in the hull, and in such manner as will allow them to be temporarily removed, and in no case shall the tanks be punctured or opened for such fastenings. The tops of such tanks shall be thoroughly protected by a grating or platform or by the thwarts or seats. Such air tanks of 6 cubic feet or less shall be constructed of material of a thickness not less than No. 22 B. W. G.; from 6 cubic feet to and including 15 cubic feet, of a thickness not less than No. 20 B. W. G.; and all air tanks of more than 15 cubic feet capacity shall be of a thickness not less than No. 18 B. W. G.

All joints of air tanks shall be properly double riveted and tightly calked or securely hook jointed and efficiently soldered or properly and securely welded, and such air tanks shall be located in such a manner that will permit the lifeboat to be on as near an even keel as possible when flooded with water.

The cubical contents of air space of air tank shall be stamped on the tank where same can be seen when air tank is placed in boat.

All air tanks shall be fitted with a connection of one-half inch outside diameter for testing purposes.

Before any lifeboat is passed and accepted, the air tanks thereof shall be tested in the presence of an inspector of this service by an air pressure of not more than 1 pound to the square inch. At each subsequent annual inspection, or oftener if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right

and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Secs. 4405, 4488, R. S.)

### CUBIC CAPACITY OF OPEN BOATS OF THE FIRST CLASS.

31. First. The cubic capacity of an open boat of type 1A or 1B shall be determined by *Stirling's* (*Simpson's*) *rule* or by any other method, approved by the Board of Supervising Inspectors, giving the same degree of accuracy. The capacity of a square-sterned boat shall be calculated as if the boat had a pointed stern.

Second. For example, the capacity in cubic feet of a boat, calculated by the aid of Stirling's rule, may be considered as given by the following formula:

$$\text{Capacity} = \frac{l}{12}(4A + 2B + 4C)$$

being the length of the boat in feet from the inside of the planking or plating at the stem to the corresponding point at the sternpost; in the case of a boat with a square stern, the length is measured to the inside of the transom. A, B, C denote, respectively, the areas of the cross sections at the quarter length forward, amidships, and the quarter length aft, which correspond to the three points obtained by dividing $l$ into four equal parts. (The areas corresponding to the two ends of the boat are considered negligible.)

The areas A, B, C shall be deemed to be given in square feet by the successive application of the following formula to each of the three cross sections:

$$\text{Area} = \frac{h}{12}(a + 4b + 2c + 4d + e)$$

$h$ being the depth measured in feet inside the planking or plating from the keel to the level of the gunwale, or, in certain cases, to a lower level, as determined hereafter. $a$, $b$, $c$, $d$, $e$ denote the horizontal breadths of the boat measured in feet at the upper and lower points of the depth and at the three points obtained by dividing $h$ into four equal parts ($a$ and $e$ being the breadths at the extreme points, and $c$ at the middle point, of $h$).

Third. If the sheer of the gunwale, measured at the two points situated at a quarter of the length of the boat from the ends, exceeds 1 per cent of the length of the boat, the depth employed in calculating the area of the cross sections A or C shall be deemed to be the depth amidships plus 1 per cent of the length of the boat.

Fourth. If the depth of the boat amidships exceeds 45 per cent of the breadth, the depth employed in calculating the area of the midship cross section B shall be deemed to be equal to 45 per cent of the breadth; and the depth employed in calculating the areas of the quarter-length sections A and C is obtained by increasing this last figure by an amount equal to 1 per cent of the length of the boat, provided that in no case shall the depths employed in the calculation exceed the actual depths at these points.

Fifth. If the depth of the boat is greater than 4 feet, the number of persons given by the application of this rule shall be reduced in

proportion to the ratio of 4 feet to the actual depth, until the boa has been satisfactorily tested afloat with that number of persons or board, all wearing life jackets.

Sixth. The following rule may be used, provided it does not giv a greater capacity than that obtained by the above method: Measur the length and breadth outside of the planking or plating and th depth inside at the place of minimum depth. The depth used in cal culating shall not in any case exceed 45 per cent of the breadth. Th product of these dimensions multiplied by 0.6 resulting in the neares whole number shall be deemed the capacity in cubic feet.

To determine the number of persons a boat may carry, divide th result by 10 for ocean steam vessels.

*Example.*

The carrying capacity of a boat 22 feet in length, 6 feet in breadt and $2\frac{1}{2}$ feet in depth shall be determined as follows:

$$\frac{22\times 6\times 2\frac{1}{2}\times 0.6}{10}=\frac{198}{10}=19 \text{ persons.}$$

In all cases the vessel owner has the right to require that the cubi capacity of the boat shall be determined by exact measurement.

Seventh. The cubic capacity of a *motor boat* is obtained by deduct ing from the gross capacity a volume equal to that occupied by th motor and its accessories.

DECK AREA OF PONTOON BOATS AND OPEN BOATS OF THE SECOND CLAS

32. First. The area of the deck of a pontoon boat of type 1C, 2B or 2C shall be determined by the method indicated below or by an other method giving the same degree of accuracy. The same rul is to be applied in determining the area within the fixed bulwark of a boat of type 2A.

Second. For example, the surface in square feet of a boat may b deemed to be given by the following formula:

$$\text{Area}=\frac{l}{12}(2a+1.5b+4c+1.5d+2e)$$

$l$ being the length in feet from the intersection of the outside of th planking with the stem to the corresponding point at the sternpost $a$, $b$, $c$, $d$, $e$ denote the horizontal breaths in feet outside the plank ing at the points obtained by dividing $l$ into four equal parts and sub dividing the foremost and aftermost parts into two equal parts ( and $e$ being the breadths at the extreme subdivisions, $c$ at the middl point of the length, and $b$ and $d$ at the intermediate points).

The minimum cubic capacity of open boats of type 1A shall b not less than 10 cubic feet for each person.

The minimum cubic capacity of open boats of type 2B shall b not less than 9 cubic feet for each person.

The minimum deck capacity for open boats of type 2A and pon toon boats of type 2C shall be not less than $3\frac{1}{2}$ square feet, and pontoon boats of types 2B and 1C not less than $3\frac{1}{4}$ square feet.

If after a practical demonstration it is found that there is a greater seating capacity than is allowed by the above, the number of square feet may be reduced, but never less than 3 square feet for each person.

CAPACITY LIMITS.

33. Pontoon boats and pontoon rafts shall never be marked with a number of persons greater than that obtained in the manner specified in this section.

This number shall be reduced—

First. When it is greater than the number of persons for which there is proper seating accommodation, the latter number being determined in such a way that the persons when seated do not interfere in any way with the use of the oars.

Second. When in the case of boats other than those of the first two sections of the first class, the freeboard, when the boat is fully loaded, is less than the freeboard laid down for each type respectively. In such circumstances the number shall be reduced until the freeboard, when the boat is fully loaded, is at least equal to the standard freeboard laid down above.

In boats of types 1C and 2B the raised part of the deck at the sides may be regarded as affording seating accommodation.

EQUIVALENTS FOR AND WEIGHT OF THE PERSONS.

34. In test for determining the number of persons which a boat or pontoon raft can accommodate each person shall be assumed to be an adult person wearing a life preserver.

In verifications of freeboard the pontoon boats shall be loaded with a weight of at least 165 pounds for each adult person that the pontoon boat is authorized to carry.

In all cases two children under 12 years of age shall be reckoned as one person.

MARKING OF LIFEBOATS.

35. All lifeboats shall have the number of boat plainly marked or painted on each bow, in figures not less than 3 inches high. Where lifeboats are carried on both sides of a vessel, lifeboat No. 1 shall be forward on starboard side of vessel, lifeboat No. 2 forward on port side, lifeboat No. 3 next abaft lifeboat No. 1 on starboard side, lifeboat No. 4 next abaft lifeboat No. 2 on port side, and so forth, the odd-numbered boats being on the starboard side and the even-numbered boats being on the port side of vessel. All lifeboats shall have their cubic contents and the number of persons such lifeboat is allowed to carry plainly marked or painted on each bow in letters and figures not less than three-fourths of an inch high. All lifeboats shall also have the number of persons allowed to be carried plainly marked or painted on top of at least two of the thwarts, in letters and figures not less than 3 inches high. When the letters and figures above required are painted on lifeboats, such letters and figures shall be dark on a light ground or light on a dark ground. (Secs. 4405, 4488, R. S.)

LIFEBOATS AND LIFE RAFTS KEPT CLEAR FOR LAUNCHING.

36. The decks on which lifeboats of any class or life rafts are carried shall be kept clear of freight or any other obstruction that would interfere with the immediate launching of the lifeboats or life rafts. (Secs. 4405, 4488, R. S.)

BOAT-DAVIT FALLS AND RECEPTACLES THEREFOR.

37. It shall be the duty of the master or officer in charge of all vessels to see that the boat-davit falls shall at all times be in readiness for immediate use, and protected from ice, and not painted, and such boat-davit falls on all boats not swung out at boat drills shall be cast loose and overhauled; and it shall be unlawful to stow in any lifeboat articles other than those required by law and regulations. On all steamers over 1,000 gross tons, covered tubs, boxes, or reels shall be provided in which to stow away the boat-davit falls.

Where more than one lifeboat is served under one set of davits, means shall be provided that will prevent davit tackles from twisting or capsizing, and that will permit the tackles being readily rounded up for the purpose of launching the remaining lifeboats under such davits: *Provided,* That when davits are equipped with separate tackles for each boat, such nontwisting and noncapsizing device is not required. (Secs. 4405, 4488, R. S.)

CARE OF LIFEBOATS.

38. Lifeboats shall be stripped, cleaned, thoroughly overhauled, and painted at least once in every year. (Sec. 4488, R. S.)

STRENGTH AND TEST OF BOATS.

39. Each boat shall be of sufficient strength to enable it to be safely lowered into the water when loaded with its full complement of persons and equipment.

At every annual inspection of a passenger vessel every lifeboat shall be tested by lowering to the water, or when it can not be lowered to the water, to a wharf, and loaded to its allowed capacity, evenly distributed throughout its length. The boat shall then be lifted clear of the water or wharf to determine that the boat and falls are of sufficient strength. In making the above test of lifeboats, the weight of each person shall average at least 140 pounds. When deadweight is used, the weight shall be equivalent to at least 140 pounds for each person allowed. (Secs. 4405, 4488, R. S.)

SIZE OF BOATS.

40. No lifeboat for use on ocean steam vessels shall be of less than 180 cubic feet capacity, except that all pleasure steamers, and other steamers not exceeding 1,000 gross tons limited by their certificate of inspection to routes not exceeding 15 miles from any harbor shall only be required to carry one lifeboat of 180 cubic feet capacity. Nothing, however, shall exempt such steamers from carrying the aggregate cubic capacity required by the rules. The minimum capacity of lifeboats for this class of vessels shall be 125 cubic feet.

The supervising inspector of the district may, in exceptional cases permit lifeboats of less than 180 cubic feet as a substitute for said boat on steamers where the crew is insufficient to properly handle a boat of that size, or where there is lack of space to properly carrry so large a lifeboat, but in every such case the steamer shall be provided with one or more lifeboats efficient in character and large enough to carry every person on board, and in no case shall the lifeboat be of less capacity than 125 cubic feet. (Sec. 4488, R. S.)

### HANDLING OF THE BOATS AND RAFTS.

41. All the boats and rafts must be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the boats and rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements must be such that it may be possible to launch on either side of the vessel as large a number of boats and rafts as possible.

### LIFE RAFTS.

#### DRAWINGS, SPECIFICATIONS, NAME PLATE, AND HOW MARKED.

42. All life rafts shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the life rafts are built.

Builders of life rafts shall furnish the supervising inspector of the district in which the life rafts are built drawings, or blue prints, and specifications, showing and explaining the construction of same and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation, in a length of 4 inches, of at least 20 per cent when the thickness of the metal is of, or greater than, No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of life rafts shall affix a plate or other device to each life raft, having thereon the builder's name, number of raft, date of construction of raft, cubical contents of raft, and number of persons said raft will carry, as determined by the rules of the Board of Supervising Inspectors.

There shall be stenciled in a conspicuous place on each life raft now in use the number of persons said raft can carry, as hereinafter provided. (Secs. 4405, 4488, R. S.)

#### INSPECTION OF LIFE RAFTS WHEN BUILT.

43. Supervising inspectors of districts where life rafts are built shall detail an assistant or local inspector to any place where life rafts are being built, whose duty it shall be to carefully inspect and examine the construction of such life rafts, and he shall satisfy himself that such life rafts are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the raft he shall stamp his initials, together with the letters U. S. I., on a blank space on the plate required to be affixed to the raft by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the raft has been constructed

in accordance with the drawings, or blue prints, and specificatio on file.

This section shall apply to all life rafts constructed after June 30 1912. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF RAFTS OF THE CATAMARAN TYPE.

44. All metal life-raft cylinders of more than 15 feet in length or c more than 16 inches in diameter shall be constructed of metal not les than No. 18 B. W. G. No life-raft cylinders shall be of less thickne of metal than No. 20 B. W. G.

The retaining bands which secure the cylinders to the frames sha be made in halves, so that the cylinders may be detached without diffi culty and without disassembling the body of the raft, for the purpos of inspection, cleaning, and painting, as required by section 46 Wooden guards and gunwales shall be secured to the retaining band by angle-iron clips or by the jaws of the retaining bands. Iron rod extending across the raft at top and bottom shall pass through th gunwale and its securing clips or jaws at each end of the raft. Th ends of the rods shall be properly secured with a screw nut inside an outside of the gunwale.

All such cylinders shall be divided by water-tight bulkheads int not less than three compartments of equal lengths. Cylinders ove 9 feet in length shall be divided into equal lengths by water-tigh bulkheads into not less than one compartment for every 3 feet of it length. One of such bulkheads shall be at the extreme end of eac cylinder or as near thereto as the flange of cone or bumped ends wil permit. Each compartment shall be provided with a suitable air pump connection of one-half inch outside diameter, fitted with air tight cap.

Only countersunk-headed rivets shall be used in the construction o metallic life rafts.

All seams and joints shall be properly double riveted.

The above provisions of this section shall take effect only as to lif rafts constructed after December 31, 1908.

The circumferential as well as the longitudinal seams of life-raf cylinders shall be riveted and tightly calked, or securely hook jointe and efficiently soldered, or properly and securely welded on rafts con structed after June 30, 1905. Such longitudinal seams shall b secured by not less than 12 rivets to each foot, circumferential seam by not less than 10 rivets to each foot, and bulkheads by not less tha 8 rivets to each foot. Bulkhead flanges may be single riveted. Th diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders of metallic life rafts sha be substantially built and capable of resisting the strain which tend to break the cylinders apart when the raft is broadside on in surf o seaway. (Sec. 4488, R. S.)

TESTS OF AIR TANKS OF LIFE RAFTS.

45. Before any life raft is passed and accepted, the air tanks there shall be tested in the presence of an inspector of this Service by a air pressure of not more than 1 pound to the square inch. At eac subsequent annual inspection, or oftener, if in the opinion of th inspectors it is necessary or desirable, the inspectors shall satisfy them selves that the tanks are in good condition, but pressure need not b

applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Sec. 4488, R. S.)

CARE OF LIFE RAFTS.

46. All life rafts shall be stripped, cleaned, painted, and thoroughly overhauled at least once in every year, and inspectors shall carefully examine at all inspections the material which supports the platform of all life floats in order to determine to their satisfaction that the strength is maintained. If it is found that deterioration has begun it shall be corrected even to the extent of requiring the renewal of the platform-supporting device. (Secs. 4405, 4488, R. S.)

APPROVED LIFE RAFTS.

47. Any type of life rafts approved by the Board of Supervising Inspectors shall be considered as equivalent to the standard raft above specified. (Sec. 4488, R. S.)

CLARK LIFE RAFTS.

48. Clark life rafts shall be constructed, tested, and rated in accordance with the following specifications:

All cylinders of more than 16 inches in diameter shall be constructed of metal not less than No. 18 B. W. G., and no cylinder shall be of less thickness of metal than No. 20 B. W. G. Cylinders shall be provided with a suitable air-pump connection of one-half inch outside diameter, fitted with air-tight cap.

The inspection of life rafts shall include the testing of each compartment by air pressure.

The circumferential as well as the longitudinal seams of cylinders shall be riveted and tightly calked, or securely hook jointed and efficiently soldered, or properly and securely welded. Such longitudinal seams shall be secured by not less than 12 rivets to each foot, circumferential seams by not less than 10 rivets to each foot, and bulkheads by not less than 8 rivets to each foot.

Only countersunk-headed rivets shall be used in the construction of cylinders. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders shall be substantially built and capable of resisting the strain which tends to break the raft apart when the raft is broadside on in surf or when in seaway.

There shall be allowed for each person carried not less than 3 cubic feet of air space and a deck area of not less than 4 square feet.

On and after May 1, 1917, the iron or steel bolts and nuts used in the construction of Clark rafts for service on salt water shall be galvanized. Nuts shall not be countersunk in the wood frame, but shall be protected by a wooden batten properly fitted over the nuts and fayed neatly to the frame. (Sec. 4488, R. S.)

USE OF BARSTOW LIFE RAFT PROHIBITED.

49. The use of the Barstow life raft is prohibited on vessels on any waters after February 28, 1914. (Sec. 4488, R. S.)

CAPACITY AND ALLOWANCE OF LIFE RAFTS.

50. No type of raft may be approved unless it satisfies the following conditions:

First. It should be reversible and fitted with bulwarks of wood canvas, or other suitable material on both sides. These bulwarks may be collapsible and shall be not less than 4 inches high.

Second. It should be of such size, strength, and weight that it can be handled without mechanical appliances, and, if necessary, be thrown from the vessel's deck.

Third. It should have not less than 3 cubic feet of air cases or equivalent buoyancy for each person whom it can accommodate.

Fourth. It should have a deck area of not less than 4 square feet for each person whom it can accommodate, and the platform should be not less than 6 inches above the water level when the raft is loaded.

Fifth. The air tanks or equivalent buoyancy should be placed as near as possible to the sides of the raft.

Rafts shall never be allowed a greater number of persons than for which there is proper seating capacity without interfering with the use of the oars. At least one-half of the number of life rafts on all steam vessels shall each have a capacity exceeding 15 persons.

*Tule* and all other types of life rafts shall meet the requirements herein specified. (Sec. 4488, R. S.)

HANDLING OF THE RAFTS.

51. All rafts must be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements must be such that it may be possible to launch on either side of the vessel as large a number of rafts as possible.

EQUIPMENT FOR LIFE RAFTS.

52. All life rafts on ocean steam vessels shall be equipped as follows:

A properly secured life line entirely around the sides and ends of the raft, festooned to the gunwales in bights not longer than 3 feet with a seine float in each bight.

One painter of manila rope of $2\frac{3}{4}$ inches in circumference, and of suitable length.

Four oars.

Five rowlocks properly attached.

One boat hook attached to a staff of suitable length.

One self-igniting life-buoy light.

One sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water, and so arranged that it can be attached to the sea anchor.

A water-tight receptacle containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal and fitted with an opening in the top not less than 5 inches in diameter properly protected by a screw cap made of heavy cast brass, with

machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

A water-tight receptacle containing 1 quart of water for each person.

Two enameled drinking cups.

A water-tight metal case containing six self-igniting red lights capable of burning at least two minutes.

A water-tight box of matches.

All loose equipment must be securely attached to the raft to which it belongs. (Sec. 4488, R. S.)

CERTIFICATED LIFEBOAT MEN—MANNING OF THE BOATS.

53. There shall be for each boat or raft a number of lifeboat men at least equal to that specified as follows: If the boat or raft carries 25 persons or less, the minimum number of certificated lifeboat men shall be 1; if the boat or raft carries 26 persons and less than 41 persons, the minimum number of certificated lifeboat men shall be 2; if the boat or raft carries 41 persons and less than 61 persons, the minimum number of certificated lifeboat men shall be 3; if the boat or raft carries from 61 to 85 persons, the minimum number of certificated lifeboat men shall be 4; if the boat or raft carries from 86 to 110 persons, the minimum number of certificated lifeboat men shall be 5; if the boat or raft carries from 111 to 160 persons, the minimum number of certificated lifeboat men shall be 6; if the boat or raft carries from 161 to 210 persons, the minimum number of certificated lifeboat men shall be 7; and, thereafter, 1 additional certificated lifeboat man for each additional 50 persons: *Provided*, That if the raft carries 15 persons or less a licensed officer or able seaman need not be placed in charge of such raft: *Provided further*, That one-half the number of rafts carried shall have a capacity of exceeding 15 persons.

The allocation of the certificated lifeboat men to each boat and raft remains within the discretion of the master, according to the circumstances.

By "certificated lifeboat man" is meant any member of the crew who holds a certificate of efficiency issued under the authority of the Secretary of Commerce.

In order to obtain the special lifeboat man's certificate the applicant must prove to the satisfaction of an officer designated by the Secretary of Commerce that he has been trained in all the operations connected with launching lifeboats and the use of oars; that he is acquainted with the practical handling of the boats themselves; and, further, that he is capable of understanding and answering the orders relative to lifeboat service.

MANNING OF BOATS.

54. A licensed officer or able seaman shall be placed in charge of each boat or pontoon raft; he shall have a list of its lifeboat men and other members of its crew which shall be sufficient for her safe management, and shall see that the men placed under his orders are acquainted with their several duties and stations.

A man capable of working the motor shall be assigned to each motor boat.

The duty of seeing that the boats, pontoon rafts, and other lif saving appliances are at all times ready for use shall be assigned t one or more officers.

LIFE PRESERVERS.

55. Every vessel inspected under the provisions of Title LI Revised Statutes of the United States, shall be provided with or good life preserver, having the approval of the Board of Supervisin Inspectors, for each and every person carried, and every vessel carry ing passengers shall have in addition thereto a number of life pr servers suitable for children equal to at least 10 per cent of the tot number of persons carried.

Every life preserver adjustable to the body of an adult perso manufactured after February 10, 1923, shall be of the reversible typ made of suitable material approved by the Board of Supervisin Inspectors, with straps properly attached on each side of the body c the life preserver (thus making it reversible), with recesses und the arms, thereby allowing the front and back sections to fi around the upper part of the wearer, and held in place by th straps, and the upper part of the life preserver shall be made vest like, the whole so constructed as to place the main buoyant body c the device underneath the shoulders and around the body in a manne that it will support the person wearing it in an upright or a slightl backward position.

All such life preservers shall be not less than 52 inches in lengt when measured laid flat, and every life preserver shall be capabl of sustaining for a continuous period of at least 24 hours an attache weight so arranged that whether the said weight be submerged o not there shall be a direct downward gravitation pull upon said lif preserver of at least 20 pounds.

All life preservers shall be covered with uncolored material withou filling or sizing, of sufficient weight and strength to fully protect th contents, such material to be unbleached cotton drill or twill of no less than 6 ounces in weight to a section of 30 by 36 inches. Suc covering on the body of each life preserver shall be of one piece only and the outside longitudinal edge of the covering seam shall b turned to a roll and closely rope stitched: *Provided*, That the mate rial used in construction of the vestlike top may be made of separat pieces of like material of the same weight, gored to fit, and securel sewed by a double row of stitching to top of such life preserver *Provided further*, That vivatex may be used as a cover for life pre servers when such material is of a weight not less than 10.2 ounce per square yard.

The straps or other approved means of securing the life preserve about the body of the wearer shall be of double-woven cotton tape o $1\frac{1}{4}$ inches width with two selvage or cord edges, of 175 pounds tensil strength, extending along both sides of the life preserver and secure thereto in a permanent manner, so as to make such life preserve reversible, the ends of the straps extending 12 inches beyond th ends of the jacket: *Provided*, That when it becomes necessary t replace belt straps on life preservers of the single-belt type, it sha be done in the foregoing manner, so as to make such repaired lif preservers reversible.

All thread used in the construction of life preservers shall be of size and strength not less than Barbour's linen, three-cord, No. 2

machine thread, and any thread other than linen shall be approved by the Board of Supervising Inspectors before being permitted to be used. All seams and other machine sewing on life preservers shall be with a short lock stitch, not less than eight stitches to the inch.

Cork block life preservers shall contain an aggregate weight of 5½ pounds of good cork in the body thereof, and where the blocks are made up of separate pieces said pieces shall be fastened with non-corrosive materials.

Blocks of compressed cork when used in life preservers shall weigh in the aggregate not less than 5½ pounds in the body thereof, and shall be so constructed that said blocks will sustain, without disintegration or substantial expansion, a submersion test satisfactory to the inspector examining the same, and that at the expiration of such test shall have the buoyancy above required.

Blocks of balsa wood or sheaves of tule when used in life preservers shall fulfill the same requirements as for life preservers constructed of solid or compressed cork as to construction, material in cover, straps, and thread, and be subjected to similar tests for buoyancy.

The edges, corners, and outside surface of block material used in the construction of life preservers shall present a smooth surface to guard against undue destruction of the covering material and present suitable smooth surface for legible stenciling and stamping by the inspectors making the inspection.

When a kapok collar is provided, it shall be filled with prime Java kapok, efficiently tufted, such collar filling to weigh at least 10 ounces, and every such kapok collar shall be capable of sustaining for a continuous period of at least 48 hours an attached weight so arranged that whether the weight shall be submerged or not there shall be a direct downward gravitation pull of at least eleven times the weight of the completed collar or collar sample undergoing the test. Such kapok supporting collars and all other supporting collars shall be subjected to buoyancy test separate and independent to that of the test required for the body of the life preserver.

Every new type of life preserver submitted to the Board of Supervising Inspectors for approval shall be accompanied by specifications, blue prints, or drawings, in triplicate, and no such type of life preserver shall be approved without an actual satisfactory service test being witnessed by the Board of Supervising Inspectors.

All life preservers shall be marked with the name and address of the manufacturer.

After September 2, 1921, no life preserver shall be passed at the factory inspection which does not fulfill the foregoing requirements, but life preservers now in use or already passed at factory inspection may be used on board vessels, provided they are constructed in accordance with the laws and regulations in force up to the date of September 2, 1921, and are in good and serviceable condition: *Provided,* That life preservers that have deteriorated to the extent of requiring new covers may be used upon vessels under the jurisdiction of this Service when reconstructed in a manner to conform in every particular with the foregoing requirements.

Inspectors are required to direct such life preservers to be distributed throughout the cabins, staterooms, berths, and other places convenient for passengers on such steamers, and there shall be a *printed notice* posted in every cabin and stateroom and in conspicuous places about the deck informing passengers of the location of

life preservers and of the mode of applying or adjusting the sam
Life preservers on passenger, excursion, and ferry steamers wh
stowed overhead shall be so supported that they can be quick
released and distributed among the passengers, and the inspect
shall satisfy himself as to the efficiency of the means used for su
purpose by actual experiment; and when such life preservers a
stowed overhead at a height greater than 7 feet from the deck belc
efficient means shall be provided for such immediate release and di
tribution to be operated by persons standing on the deck below.

The supervising inspector of the district shall detail a local
assistant inspector to any place where life preservers are manufa
tured, whose duty it shall be to test and examine all life preserve
manufactured at that place and satisfy himself that such life pr
servers are in accordance with the requirements of the Board
Supervising Inspectors. When found to be in accordance with tl
requirements, the inspector shall stamp them with a stamp bearir
the initials of his name and the date of examination and certifyir
that they have been examined and passed. When life preservers a
so stamped, it shall be prima facie evidence that they comply wit
the requirements of law and regulations as to their original constru
tion, and they may thereafter be accepted by inspectors, in the
discretion, as being in accordance with the rules and regulations
the Board of Supervising Inspectors. Any life preserver of a typ
that has been approved by the Board of Supervising Inspectors su
sequent to 1922 may be examined and passed as provided for b
this paragraph after the same has had the approval of the supe
vising inspector of the district in which it is manufactured, and ever
manufacturer of such life preservers shall furnish 12 sets of blu
prints or drawings and specifications to the said supervising inspe
tor, one of which shall be forwarded to the bureau, and one to eac
supervising inspector.

At each annual inspection of any vessel, and oftener if deeme
necessary, it shall be the duty of the inspectors making the inspectio
to examine and inspect all life preservers in the equipment of suc
vessel and satisfy themselves (or himself) that such life preserve
are in accordance with the requirements of the Board of Supervisir
Inspectors: *Provided*, That when any block of compressed cork use
in a compressed-cork type life preserver is found to be in a broke
or granulated condition, such compressed-cork block shall be co
demned as unfit for further use. When found to be in accordan
with the requirements, the inspector shall plainly stamp them with
stamp bearing the word "Passed," his initials, the inspector's por
and the date of approval: *Provided*, That at the annual inspectio
of a vessel, or oftener if necessary, at least 5 per cent of all *kap*
*life preservers*, or such greater number as may be deemed necessa
or desirable, shall be subjected to a buoyancy test, as follows: Life pr
server containing kapok as buoyant material in the body thereof, if f
the use of adults, shall be subjected to a test for buoyancy by bei
entirely submerged for a period of two hours, after which it shall
capable of sustaining in water an attached weight having an actu
downward graviation pull of 20 pounds when the weight is submerge
and kapok life preservers with kapok collars shall be subjected to
similar test, except that the attached weight shall have an actu
downward gravitation pull of 28 pounds when the weight is su
merged. The test for children's life preserver shall be the same

the test for adults' life preserver except the final test for buoyancy, which shall be by a submerged weight of 10 pounds for life preservers without collar and 14 pounds for life preserver with collar. Any such life preserver failing to meet the required test shall be immediately condemned and removed from the vessel's equipment, and a full detailed report of every such failure shall be immediately forwarded to the supervising inspector of the district having jurisdiction.

Inspectors inspecting *Government vessels* upon request of any department of the Government may accept life preservers made under the specifications of any department of the Government, and stamp same with the inspector's stamp and an additional stamp bearing the legend "U. S." within a circle for identification, with the understanding that they are not to be used except upon Government vessels and will not be allowed as any part of the equipment of vessels under the jurisdiction of this Service.

Every life preserver for the use of *children* shall be made of suitable material approved by the Board of Supervising Inspectors, capable of sustaining in water a weight of 10 pounds for a period of 24 hours, and of the same general form of construction as to material and design as required for an adult life preserver.

Each life preserver shall be marked on the front compartment "Adults," if for the use of adults; and "Children," if for the use of children; and if of a character suitable for the use of both adults and children, it shall be so marked.

Life preservers which depend upon *inflation or air compartments* for buoyancy, or which are constructed of *loose granulated material* or any other material not approved by the Board of Supervising Inspectors, shall not be allowed. Any life preserver hereafter approved by the Board of Supervising Inspectors may be accepted in lieu of those specified in this section.

KAPOK LIFE PRESERVERS.

Every type of kapok life preserver used on any vessel subject to inspection by this Service shall first be approved by the Board of Supervising Inspectors. The life preservers receiving such approval shall conform in every respect to the sample submitted to the board.

Kapok life preservers to receive the approval of the board shall be simple in design and of a character to support the wearer in an upright or slightly backward position. The life preserver shall be filled with not less than 1½ pounds of prime Java kapok and shall be suitably and efficiently tufted. It shall be tested for buoyancy as follows:

First. At least 1 life preserver from each lot of 250 shall be selected indiscriminately by an inspector of this Service for buoyancy test.

Second. The life preserver shall be submerged in a tank of fresh water for a period of 48 hours.

Third. The life preserver shall then support in fresh water a submerged weight of 20 pounds for a period of 24 hours. Whenever life preservers contain more than 1½ pounds of kapok in the body thereof the buoyant test shall be made in the ratio of 20 pounds to each 1½ pounds of kapok.

When a kapok collar is provided, it shall be filled with prime Java kapok, efficiently tufted, such collar filling to weigh at least 10 ounces, and every such kapok collar shall be capable of sustaining

for a continuous period of at least 48 hours an attached weight so arranged that whether the weight shall be submerged or not there shall be a direct downward gravitation pull of at least 11 times the weight of the completed collar or collar sample undergoing the test. Such kapok supporting collars and all other supporting collars shall be subjected to a buoyancy test separate and independent to that of the test required for the body of the life preserver.

All approved kapok life preservers shall be marked with the name and address of the manufacturer. Each life preserver shall be marked on the front compartment "Adults," if for the use of adults; and "Children," if for the use of children; and if of a character suitable for the use of both adults and children, it shall be so marked.

For each lot of 250 life preservers the manufacturer shall submit to the local inspectors of the district in which maufactured an affidavit setting forth the material with which the life preservers are filled and that the life preservers meet in every respect the requirements of the General Rules and Regulations of the Board of Supervising Inspectors. Every life preserver meeting the above requirements shall be inspected by an inspector of this Service and stamped with his initials and the date of inspection. (Sec. 4488, R. S.)

### RING LIFE BUOYS.

56. The minimum number of life buoys with which vessels are to be provided is fixed as follows:

Vessels under 100 feet in length, minimum number of buoys, 2; vessels 100 feet and less than 200 feet in length, minimum number of buoys, 4, of which 2 shall be luminous; vessels 200 feet and less than 300 feet in length, minimum number of buoys, 6, of which 2 shall be luminous; vessels 300 feet and less than 400 feet in length, minimum number of buoys, 12, of which 4 shall be luminous; vessels 400 feet and less than 600 feet in length, minimum number of buoys, 18, of which 9 shall be luminous; vessels 600 feet and less than 800 feet in length, minimum number of buoys, 24, of which 12 shall be luminous; vessels 800 feet and over in length, minimum number of buoys, 30, of which 15 shall be luminous.

Ring life buoys shall be of solid cork or any other equivalent material, shall be of not less than 30 inches outside diameter and not less than 17 inches inside diameter, and shall be capable of sustaining in fresh water for a continuous period of 24 hours an attached weight so arranged that, whether said weight be submerged or not, there shall be a direct downward gravitation pull upon the buoy of not less than 31 pounds. The body of the buoy before being covered shall stand a downward gravity pull of 200 pounds, the weight to be attached to the buoy body by a sling covering a surface of 2 linear inches, without breaking, without rupture of the joints, or without showing a maximum elongation of internal diameter in excess of 1½ inches while the weight is attached after being under this test for a period of 30 minutes.

The buoy shall be covered with cloth of sufficient weight and strength to fully protect the body of the buoy. Such material shall be of a strength equivalent to an unbleached single-filling cotton duck having a weight of 8 ounces to a section 36 by 36 inches.

The cover shall be constructed and placed on the body of the buoy in a substantial manner. All seams and other machine sewing

on the buoy shall be with a short lock stitch not less than eight stitches to the inch. The inside seam shall be sewed with a rope stitch not less than three stitches to the inch.

Four beckets 2½ inches wide, made from the same material as the covering of the buoy, shall be securely attached to the buoy and spaced an equal distance from each other. A line shall pass through the beckets, which shall be sewed tightly together to prevent slipping. The line shall be manila, three-eighths inch in diameter, three-ply medium lay, of good quality, having the ends securely and neatly spliced, the line to be festooned in bights around the outer edge of the buoy. All thread used in the construction of the buoy shall be No. 16, three-cord linen.

When the buoy is made of cork, the cork form shall be constructed of sound, buoyant corkwood, in two layers or thicknesses. The cork sheets shall be flattened and smoothed so that the back or outside hard crust is removed sufficiently to give a smooth surface for gluing. One layer shall be built of segments not to exceed four in number. The other layer may be built of segments not to exceed eight in number. The ends of all segments shall be fitted neatly and glued securely one to the other. The two layers shall be neatly joined and properly and securely dowel-pinned and glued firmly together, with joints staggered or broken. The glue used shall be insoluble in water, and the finished buoy shall stand steaming at a pressure of 2 pounds for a period of 30 minutes without disintegration or other positive indications of the glue losing its adhesive properties. When completed, the outside of the buoy shall be of good, sound corkwood finished to a smooth surface. Any form of construction which will meet the general purposes of the above specifications and requirements may be used after having been approved by the Board of Supervising Inspectors.

The supervising inspector of the district shall detail a local or assistant inspector to any place where cork ring life buoys are manufactured within his district, whose duty it shall be to test and examine all such buoys manufactured at that place. When a cork ring life buoy is found to be in accordance with the requirements of the rules of the Board of Supervising Inspectors, the inspector shall stamp the cork, and, after completion of the buoy, shall stamp the cover with the word "Passed," his initials, the inspection port, and the date of approval. The cork and the cover shall also be stamped by the manufacturer with the name or trade-mark of the manufacturer.

*Balsa-wood A B C ring life buoys* shall be constructed of good, fresh, sound balsa wood and shall be made in two layers with not more than four pieces in each layer, the same to be properly and securely dowel-pinned, and shall be of not less than 30 inches outside diameter and not less than 17 inches inside diameter, and of sufficient buoyancy to sustain the specified weight and give the buoyancy required, and shall be covered with the same weight canvas, stitched, roped, and marked or stamped as required by the specifications for cork ring life buoys.

The use of kapok, rushes, cork shavings, granulated cork, or any other loose granulated material, or compartments which depend on inflation for their buoyancy, is not allowed in the manufacture of ring life buoys.

Ring life buoys shall not be permanently secured in any way, but shall be so placed as to be readily accessible in an emergency. Their location shall be plainly indicated.

One of the buoys on each side of the vessel shall have a life line attached of at least 15 fathoms in length.

*Luminous buoys* are those having attached an efficient self-igniting light which can not be extinguished in water.

SELF-IGNITING WATER LIGHTS.

57. The self-igniting water lights for ring buoys and life rafts shall consist of a cylinder (with bumped heads or ends) made of good sheet copper of not less than 0.022 inch thick, and shall be so designed as to be nonexplosive, and shall be free from any defects which may affect the serviceability or operation of the light. The cylinder shall be sufficiently weighted in the bottom to recover and maintain an upright position in the water, and all circumferential and horizontal seams of the cylinder shall be hook jointed and soldered, and the top circumferential seam shall be flush, so as to prevent the lodgment of water.

The cylinder shall be provided with a plug or other device of such character that when removed from the cylinder sufficient water will be admitted to insure the prompt and efficient action of the light regardless of whether the cylinder when first striking the water becomes completely submerged.

The removal of the plug or device shall be effected by the operation of a lanyard attached to the buoy and to the plug or device on the cylinder, and shall be so arranged and constructed that the weight of the buoy when thrown overboard will automatically disengage the plug or device, and will insure that the light will self-ignite within one minute after reaching the surface of the water: *Provided*, That on oil-tank steamers the self-igniting water light need not be attached to the ring buoy, but may be placed alongside the buoy which it is intended to serve, so that it can be easily and quickly attached to the buoy by means of its lanyard when needed in case of emergency.

On oil-tank steamers, when self-igniting water lights are not attached to the ring buoys, a snap hook shall be provided for this purpose.

The cylinder shall contain calcium carbide (taken from fresh stock entirely free from the white powdery substance resulting from exposure to the air) and calcium phosphide sufficient to create a brilliant flame of at least 150 candlepower, which shall be maintained and burn for a continuous period of not less than 45 minutes without emitting obnoxious fumes. If at any time during this period the flame is extinguished, due to the total submersion of the light, the light shall self-ignite upon coming to the surface.

The self-igniting water lights required for life rafts shall meet the above requirements, except that the plug or device may be removed by manual action instead of by automatic action of the buoy lanyard above referred to.

The cylinder shall be plainly marked with the word "Top" at its top end and permanently indented or embossed with the name and address of the manufacturer, the year of manufacture (the use of labels of any description for this purpose is strictly forbidden), and

with the statement that the device meets in every way the requirements of the Board of Supervising Inspectors.

On and after July 1, 1924, no type or make of water light will be approved which has not been tested by the Bureau of Standards, Department of Commerce, and found to conform in all respects to these requirements.

These rules for water lights shall be effective on and after July 1, 1924.

*Provided*, That water lights manufactured before April 1, 1924, and installed on vessels previous to the application of the present requirements will be allowed to remain in service so long as they are maintained in good and serviceable condition; and inspectors, when inspecting vessels having such water light equipment, shall give especial attention to the condition of the water lights, and if there appears any evidence whatsoever of corrosion, such as blisters and warts under the paint, or where the can is badly abraised by hard usage or carelessness, the same must be condemned at once and new water lights of an approved type substituted for the ones so condemned, and the attention of the officers of the vessel must then be called to the necessity for greater care to be exercised in the preservation of the equipment, and it must be made clear to them that they will be held strictly accountable to this service for the condition of the same.

### LINE-CARRYING GUNS AND EQUIPMENT.

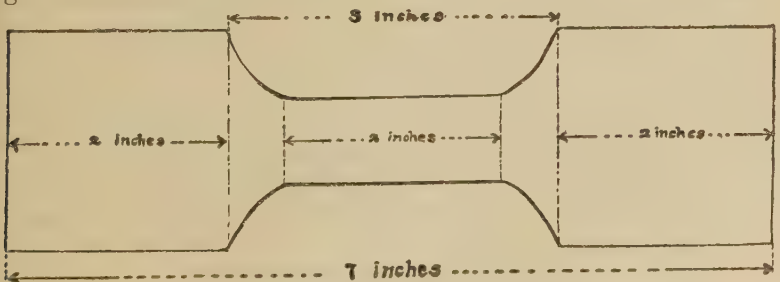
58. All steam vessels of 150 gross tons and over navigating the ocean shall be equipped with at least three line-carrying projectiles and the means of propelling them, of a type and character which have been officially approved by the Board of Supervising Inspectors. (Sec. 4488, R. S.)

### ALLOY OF LYLE-TYPE GUNS.

59. The material entering into the construction of cast-bronze guns for use on board steam vessels as a means of propelling line-carrying projectiles shall have a tensile strength of not less than 52,000 pounds per square inch of section and a reduction of area of not less than 25 per cent. (Sec. 4488, R. S.)

### SAMPLE OF GUN FOR TESTING.

60. At least one sample of the material shall be taken from the casting of each gun, and shall be not less than 7 inches in length, 2 inches in width, one-half inch in thickness, and have a section 0.5 by 0.75 inch over a length of 2 inches, according to the following diagram:




The samples for testing shall be furnished the supervising inspector of the district where the gun is to be tested and must be accompanied by an affidavit of the manufacturer of the gun that the samples

actually and correctly represent the material of the gun. Th samples must be distinctly marked with the same number appea ing on guns which they represent, so as to be readily identified b the inspector.

FIRING TEST OF LYLE AND HUNT GUNS.

61. All line-carrying guns of the cannon type shall be tested i the presence of an inspector by firing three rounds from the gun. On round at least shall carry the regular service projectile, with a servic line attached, a distance of at least 1,400 feet without breakin or fouling the line, the performance to be based upon the condition of a reasonably still atmosphere. The other rounds shall be fire with not less than the same weight of powder charge, one of whic shall be not less than a weight of 8 ounces, and with projectiles of th same weight as the service projectile, but no line need be attached *Provided,* That the distance requirement for the Hunt line-carryin gun, small, shall be only 800 feet.

The primer hole fitted in the upper wall of all guns of the canno type manufactured after June 30, 1920, shall be protected by beading, coaming, or projection extending above the wall of the gu not less than one-half inch.

The test rounds required shall be fired from the gun when mounte on its own carriage, lashed as it would be in shipboard use, and whe this test is completed, the gun and its mounting shall show no sign of fracture or damage.

The line shall be coiled, faked, or reeled in its own faking bo or reel in such manner that when all the line leaves the container i shall automatically become unattached and free from the containe The end of the line intended to be attached to the projectile sha have securely attached thereto a substantial tag bearing a permanen legend which shall indicate its purpose, and the other end of the lin shall be tagged in the same manner in order that there may be n delay in securing proper and immediate action of the equipment and the gun, carriage, line box or reel, and projectiles shall all bea the same number and shall be initialed by the inspector, whose repor of the test, giving number, date, and result, shall be filed in th office of the supervising inspector of the district in which the test i made. (Sec. 4488, R. S.)

STEEL GUNS.

62. Before any steel gun of the cannon type shall be approve the manufacturer shall furnish the supervising inspector of th district where the gun is tested a sample of the material of whic it is constructed, such sample to be of the following dimension Seven inches in length and approximately 1½ inches wide and 1 inc thick, with a section 2½ inches in the center turned down to ½ inc diameter, the sample to be accompanied by the same form of af davit as required for bronze guns. The sample shall show a tensi strength of not less than 65,000 pounds per square inch of sectio and an elongation of not less than 20 per cent in a length of 2½ inche (Sec. 4488, R. S.)

AUXILIARY LINES AND PROJECTILES.

63. All steamers required under the law to carry line-carryin projectiles and the means of propelling them shall be supplie auxiliary thereto with at least 800 feet of 3-inch manila line for vesse

of over 150 and not over 500 gross tons, and 1,500 feet of such line for steamers over 500 gross tons, and with three approved service lines and three projectiles. The auxiliary line and all other equipment shall be kept always easily and immediately accessible and ready for use in connection with the gun and shall not be used for any other purpose. (Sec. 4488, R. S.)

SHOULDER GUN.

64. The gun known as the "shoulder gun" may be used on steamers of 300 tons and under as a means of propelling a line-carrying projectile. This gun is an ordinary breech-loading rifle with barrel shortened and bore smoothed, using a blank cartridge of 45–70 or 50–70, propelling a projectile about 8 inches long, weighing about 8 ounces, attached to a line not less than 400 feet in length.

The projectile must be thrown a distance of not less than 250 feet, without fouling or breaking the line. The gun shall be of a type approved by the Steamboat-Inspection Service. The manufacturer of the gun shall furnish purchasers with an affidavit that it is of approved type, of safe material, and good workmanship. Each shoulder gun shall be provided with three shot lines, 10 projectiles, at least 25 cartridges, and the other necessary equipment. Each vessel using the shoulder gun shall carry auxiliary thereto, to be used for no other purpose, at least 500 feet of 3-inch manila line. (Sec. 4488, R. S.)

SERVICE PROJECTILE LINES AND PROJECTILES.

65. Service projectile lines shall approximate in size the line used by the United States Coast Guard and shall be not less than 1,700 feet in length, made in one continuous length without splice, knot, or other retarding feature, and must be capable of withstanding a breaking strain of 500 pounds.

The purchaser of service lines shall be furnished a statement by the dealer or manufacturer that, based upon the test of a sample from each end of the line, it is of the required strength and that the line has been examined over its entire length and found to be without splice, knot, or other defective feature. A copy of such statement shall be furnished by the purchaser or dealer to the supervising inspector of the district in which the gun and line are tested.

The container of the line shall bear the name of the manufacturer or dealer, together with the statement that the line in all respects meets the requirements of the Steamboat-Inspection Service.

The projectiles shall weigh not less than 18 pounds, be smoothly turned and finished, with a windage of not more than one sixty-fourth of an inch. No such projectile or means of propelling it shall hereafter be approved unless of such a character that the projectile and propelling charge can be readily withdrawn from the gun when it becomes necessary or desirable to do so. Powder containers of center-fire type shall be of such construction that proper alignment of firing pin and percussion primer always obtains when propelling charge and projectile are set for use. When perforated metal powder containers are used, such perforations shall extend entirely around the base of such containers, and at least 25 efficient primers shall be carried for the firing thereof.

It is recommended that the charge of powder in actual service on shipboard shall be from 5 to 6 ounces, but may be exceeded under extraordinary circumstances, and in no case shall the charge exceed 8 ounces. The end of the line attached to the projectile should be thoroughly wet for a length of about 1 fathom. (Sec. 4488, R. S.)

REPORT OF TEST OF GUN.

66. The supervising inspector shall furnish the manufacturer of any line-carrying gun a copy of the report on each gun tested and inspected. (Sec. 4405, R. S.)

DRILL REQUIRED WITH LINE-CARRYING GUNS.

67. The master of every vessel equipped with a line-carrying gun shall drill his crew in the use thereof and fire said gun at least once in every three months, using one-half the usual charge of powder and any ordinary line of proper length.

It shall be the duty of the inspectors at the annual inspection to see that these drills are entered on the log of the vessels. (Sec. 4405, R. S.)

PLACARD CONTAINING INSTRUCTIONS FOR USE OF GUN APPARATUS.

68. A placard containing instructions for using the gun apparatus required by the foregoing section and as practiced by the United States Coast Guard shall be posted in the pilot house, engine room, and in the seamen's, firemen's, and steward's department of every steam vessel required by law to carry such gun apparatus. (Sec. 4405, R. S.)

EXTRA STEERING APPARATUS, LADDERS, STAIRWAYS.

69. Extra steering apparatus consisting of relieving tackles or tiller shall be provided for all steamers: *Provided, however*, That where a steamer is equipped with auxiliary steam or hand steering gear attached to rudder entirely independent of the regular steering gear same may be used in lieu of the relieving tackles or tiller required.

Every steamer or barge carrying passengers shall be provided with suitable ladders to enable passengers to descend conveniently to the lifeboats and life rafts. One of such ladders shall be provided for each set of boat davits and kept ready and convenient for use on the boat deck and shall be long enough to reach from such deck to the vessel's seagoing light water line. All such ladders shall be reversible and free from projections in order that the garments of descending or ascending persons will not become entangled in them.

Every steam vessel shall be provided with sufficient means of escape from the lower to the upper deck, or vice versa, and every steamer of 50 tons or over carrying passengers shall be provided with permanent stairways forward and aft, except where said stairways on towing boats would interfere with towing bitts. (Secs. 4405, 4480, 4484, R. S.)

BULKHEADS.

70. Every seagoing steam vessel constructed after July 1, 1912, carrying passengers shall have a water-tight collision bulkhead. In vessels not over 200 feet in length this bulkhead shall be located about

ne-tenth the vessel's length from stem. In vessels over 200 and ot over 350 feet in length the collision bulkhead shall be located about ne-twelfth the vessel's length abaft the stem. In vessels over 350 nd not over 500 feet in length it shall be located about one-fifteenth he vessel's length abaft the stem, and in vessels over 500 feet in ength about one-sixteenth the vessel's length abaft the stem. Such essels shall also have one water-tight bulkhead forward of and one baft the engine and boilers, and in addition thereto shall have such ther water-tight bulkheads as may be necessary to provide that there hall be no space between the bulkheads to exceed in length one-fifth he length of the vessel: *Provided, however*, That in no case shall the istance between the bulkheads be greater than 80 feet.

Screw steamers shall, in addition to the above-named bulkheads, ave located at a suitable distance forward from sternpost a water-ight bulkhead to protect vessel from disaster in case of fracture of tern pipe.

Sailing vessels of over 700 tons carrying passengers for hire shall ave a water-tight collision bulkhead. Such collision bulkhead shall e placed not less than 5 feet from the stem of the vessel.

Wooden steamers carrying passengers whose cargo is restricted to umber exclusively shall only be required to have a water-tight col-sion bulkhead as described in the first paragraph of this section, lso one water-tight bulkhead forward of and one abaft the engines nd boilers.

All such bulkheads shall be of iron or steel plates not less than one-ourth inch thick and shall be securely fastened to suitable frame-vork, which framework shall be properly and securely attached to he hull. Such bulkheads shall be strengthened by vertical bars of ot less than 3½ by 3½ inch angle iron, spaced not more than 30 inches rom center to center, and all steamers that are more than 10 feet eep in any hold shall have horizontal angle irons of not less than by 3 inches on the reverse side, spaced not more than 4 feet from enter to center, in addition to the vertical angle irons: *Provided,* hat when any bulkheads are constructed of equal strength to the bove-described bulkheads, they shall be allowed by the local in-pectors.

All bulkheads shall reach to the main deck in single-decked vessels, therwise to the deck next below the main deck, but in every case hey shall reach to the deck next above the deep-load line. (Sec. 490, R. S.)

MEANS OF ESCAPE FROM STEAMERS.

71. On all steamers where the plans and arrangements will pos-ibly permit, all inclosures where passengers or crews may be quar-ered, or where anyone may be employed, shall be provided with not ess than two avenues of escape, so located that if one of such avenues s not available another may be. The locality and arrangement of uch additional means of escape shall be determined by the steamboat nspectors and the steamboat managers as will in their judgment best arry out the purposes for which this provision was made. (Sec. 417, R. S.)

STORM OIL.

72. On and after January 1, 1915, ocean vessels of more than 200 ross tons propelled by machinery and navigating the oceans or

gulfs shall carry a supply of oil for the purpose of smoothing the sea or quelling the force of the waves in case of emergency or necessity in the following quantities:

Vessels of over 200 and not over 1,000 gross tons, 30 gallons.
Vessels of over 1,000 and not over 3,000 gross tons, 40 gallons.
Vessels of over 3,000 and not over 5,000 gross tons, 50 gallons.
Vessels of over 5,000 gross tons shall carry at least 100 gallons.

This oil shall be accessible and available at all times, and the location of the supply and the means and methods of its distribution shall be determined by the master of the vessel. (Secs. 4405, 4417 R. S.)

#### STEAMER'S NAME ON EQUIPMENTS.

73. All the equipments of a steamer, such as buckets, hose, axes boats, oars, rafts, life preservers, floats, barrels, and tanks, shall be painted or branded with the name of the steamer upon which they are used. (Sec. 4405, R. S.)

## COASTWISE.

### Rule III.—Boats, Rafts, Bulkheads, and Life-Saving Appliances.

#### COASTWISE STEAMERS.

1. Under this designation shall be included all steam vessels navigating the waters of any ocean or the Gulf of Mexico 20 nautical miles or less offshore.

For the purpose of apportioning lifeboat and life-raft equipment upon coastwise steam vessels subject to the jurisdiction of the Steamboat-Inspection Service, they shall be divided into the following classes:

(*a*) Passenger steam vessels.

(*b*) Passenger steam vessels the keels of which are laid after July 1, 1915.

(*c*) Cargo steam vessels and all other steam vessels unless hereinafter provided for.

#### LIFEBOATS AND LIFE RAFTS REQUIRED.

##### LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (A).

2. Vessels of class (*a*) shall be required to have lifeboat and life raft capacity to accommodate all persons on board. Not less than 75 per cent of the total capacity shall be in lifeboats and 25 per cent may be in collapsible lifeboats or life rafts of an approved type.

Vessels of class (*a*) during the interval between May 15 and September 15 in any one year, both dates inclusive, shall only be required to be equipped with lifeboats and life rafts to accommodate 70 per cent of all persons on board, not less than 50 per cent of which shall be in lifeboats and 50 per cent may be in collapsible lifeboats or life rafts.

##### LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (B).

3. Vessels of class (*b*) shall be required to have lifeboat and life raft capacity to accommodate all persons on board throughout the year, not less than 75 per cent of which shall be in approved lifeboats and 25 per cent may be in collapsible lifeboats or rafts of an approved type.

LIFEBOATS REQUIRED ON VESSELS OF CLASS (C).

4. *Vessels of class (c)*, except cargo vessels hereafter provided for, shall carry sufficient lifeboats to accommodate all persons on board: *Provided*, That vessels engaged exclusively in the business of purse seining may use their wooden seine boats as lifeboats. Vessels engaged exclusively in the business of wrecking may use their wooden surf boats as lifeboats, and vessels engaged exclusively in the business of hook-and-line fishing from dories may use their dories as lifeboats: *Provided*, That the dories are fitted with air tanks of sufficient capacity to meet the rule for necessary air-tank equipment.

Cargo vessels shall carry a sufficient number of lifeboats on each side to accommodate all persons on board.

CARRYING OF LIFEBOATS ON VESSELS OF CLASSES (A) AND (B).

5. All vessels of classes (*a*) and (*b*) except those fitted with mechanical davits, shall, when the weather permits, have one of their lifeboats swung out on each side while at sea, brailed into a boom or rail and ready for immediate use.

LIFEBOATS REQUIRED ON INSPECTED MOTOR VESSELS.

6. All vessels propelled by machinery, other than steam, subject to the inspection laws of the United States, shall be required to have the same lifeboat and life-raft equipment as steamers of the same class, and local inspectors shall also indicate in the certificate of inspection.

Motor vessels under 50 tons, when navigating in daylight only, and when equipped with air tanks under deck of sufficient capacity to sustain afloat the vessel when full of water with her full complement of passengers and crew, or when properly subdivided by iron or steel water-tight bulkheads of sufficient strength and so arranged and located that the vessel will remain afloat with her full complement of passengers and crew with any two compartments open to the sea, shall be required to have not less than 100 cubic feet of lifeboat capacity. (Sec. 4426, R. S.)

LIFEBOATS AND OTHER EQUIPMENT REQUIRED ON SAIL VESSELS.

7. Coastwise vessels carrying passengers under the provisions of section 4417, Revised Statutes, as amended by the act of Congress approved March 3, 1905, shall be subject to the same requirements for lifeboat capacity as coastwise steamers of the same class, and in addition thereto they shall be equipped with a life preserver for each and every person on board.

LIFEBOATS AND THEIR EQUIPMENT REQUIRED ON SEAGOING BARGES OF 100 GROSS TONS OR OVER.

8. The lifeboats required on seagoing barges of 100 gross tons or over shall be at least 14 feet long and equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight.

At least two life preservers.

One painter of manila rope of not less than $2\frac{3}{4}$ inches in circumference and of suitable length.

Four oars of suitable length for size of boat.
Not less than four rowlocks attached to the boat with chains.
One boat hook attached to a staff of suitable length.
One bucket.
On wooden boats there shall be two plugs secured with chains for each drain hole.

EQUIPMENT FOR LIFEBOATS.

9. All lifeboats on coastwise steam vessels shall be equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope, and the seine float in each bight shall hang to within 12 inches of the surface of the water when the boat is light.

One painter of manila rope of not less than $2\frac{3}{4}$ inches in circumference and of suitable length.

A full complement of oars and two spare oars.

One set and a half of thole pins or rowlocks attached to the boat with separate chains.

One steering oar with rowlock or becket and one rudder with tiller or yoke and yoke lines. In boats of special construction where a rudder is difficult of installation it may be dispensed with.

One boat hook attached to a staff of suitable length.

Two life preservers.

Two hatchets.

One galvanized-iron bucket with lanyard attached.

One bailer.

Where automatic plugs are not provided there shall be two plugs secured with chains for each drain hole.

One efficient liquid compass with not less than a 2-inch card.

One lantern containing sufficient oil to burn at least nine hours and ready for immediate use.

One can containing 1 gallon of illuminating oil.

One box of friction matches wrapped in a waterproof package and carried in a box secured to the underside of the stern thwart.

A wooden breaker or suitable tank fitted with a siphon, pump, or spigot for drawing water, and containing at least 1 quart of water for each person.

Two enameled drinking cups.

A water-tight receptacle containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal, fitted with an opening in the top not less than 5 inches in diameter, properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

The United States Army ration above referred to may be any emergency ration of cereal or vegetable compound approved or used by the Army or Navy, but no ration of meat or any ration requiring saline preservative shall be allowed.

One canvas bag, containing sailmaker's palm and needles, sail twine, marline, and marline spike.

A water-tight metal case containing 12 self-igniting red lights capable of burning at least 2 minutes: *Provided*, That one standard 3-cell focusing flash light and 3 extra standard batteries contained in a portable water-tight metal case may be substituted for 6 of the required 12 self-igniting red lights.

A sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water and so arranged that it can be attached to the sea anchor.

A mast or masts with one good sail at least and proper gear for each (this does not apply to motor lifeboats), the sail and gear to be protected by a suitable canvas cover. In case of a steam vessel which carries passengers in the North Atlantic and is provided with a radiotelegraph installation, all the lifeboats need not be equipped with masts and sails. In this case at least one of the boats on each side shall be so equipped.

All loose equipment must be securely attached to the boat to which it belongs.

Lifeboats of less than 180 cubic feet capacity on pleasure steamers are not required to be equipped as above.

DRAWINGS, SPECIFICATIONS, NAME PLATE.

10. All *lifeboats* shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the lifeboats are built.

Builders of lifeboats shall furnish the supervising inspector of the district in which the lifeboats are built drawings, or blue prints, and specifications showing and explaining the construction of same, and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation in length of 4 inches of at least 20 per cent when the thickness of the metal is of, or greater than, No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of lifeboats shall affix a plate or other device to each lifeboat, having thereon the builder's name, number of boat, date of construction of boat, cubical contents of boat, and number of persons said boat will carry, as determined by the rules of the Board of Supervising Inspectors. (Secs. 4405, 4488, R. S.)

INSPECTION OF LIFEBOATS WHEN BUILT.

11. Supervising inspectors of districts where lifeboats are built shall detail an assistant or local inspector to any place where lifeboats are being built, whose duty it shall be to carefully inspect and examine the construction of such lifeboats, and he shall satisfy himself that such lifeboats are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the boat, he shall stamp his initials, together with the letters "U. S. I.," on a blank space on the plate required to be affixed to the boat by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the boat has been constructed in accordance with the drawings, or blue prints, and specifications on file. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF METALLIC LIFEBOATS FOR COASTWISE STEAMERS.

12. All metallic lifeboats for coastwise steamers shall be constructed in accordance with the following specifications:

The *keels, stems, sternposts, gunwales, and nosings* shall be of clear grain, sound oak or other suitable wood, each in one length, except that the gunwales and nosings may be made in two lengths. When made in two lengths, the gunwales shall be scarfed with a good long bevel scarf stiffened on the underside by a piece of gunwale material at least 2 feet in length, 1½ inches thick, and the width of the gunwale.

The *stem* of each boat shall be of a natural or steam crook, scarfed at least 9 inches in length on the keel and fastened thereto with two three-eighths inch through clinch bolts driven through deadwood fitted on the inside.

Each *sternpost* shall be stepped over the end of the keel half the length of sternpost and recessed at least 2½ inches deep into keel, the whole to be secured on the inside by a crook or knee of sufficient width to receive the flanges of the shell plates.

Each joint of the stem and sternpost shall be fitted with two three-eighths inch *stopwaters* under the shell flanges. Stem and sternpost shall be bearded to not less than 1½ inches.

The *flanges of shell plates* on boats not over 20 feet long shall lap on the keel, stem, and sternpost at least 2½ inches; on boats over 20 feet and not over 24 feet long, at least 2½ inches; and on boats over 24 feet long, at least 2¾ inches, to be fairly drawn up and nailed over a strip of No. 6 cotton duck the width of the flanges, which shall be secured by three rows of galvanized nails driven zigzag. No part of the keel, stem, or sternpost outside of the shell flanges shall be covered with sheet metal.

In boats not over 20 feet long the *nails* shall be driven zigzag on lines three-eighths, 1⅛, and 1⅞ inches, respectively, from the edge of the flanges, and pitched 1¾ inches. In boats over 20 feet and not over 24 feet long the nails shall be driven on lines three-eighths, 1¼, and 2⅛ inches, respectively, from the edge of the flanges, and pitched 1⅝ inches. In boats over 24 feet long the nails shall be driven on lines three-eighths, 1⅜, and 2⅜ inches, respectively, from the edge of the flanges, and pitched 1½ inches.

In boats not over 20 feet long the nails shall be not less than 1¾ inches long, No. 10 B. W. G. In boats over 20 feet and not over 24 feet long the nails shall be not less than 2 inches long, No. 10 B. W. G. In boats over 24 feet long the nails shall be not less than 2½ inches long, No. 9 B. W. G.

Metallic lifeboats of a length not over 20 feet shall be constructed of *plates* of not less thickness than No. 18 B. W. G. Boats over 20 feet and not over 24 feet long shall be constructed of plates of not less thickness than No. 16 B. W. G. Boats longer than 24 feet shall be constructed of plates of not less thickness than No. 14 B. W. G.

All *seams and joints* shall be properly double riveted. The seams and butt laps shall lap at least 1¼ inches.

The center of the row of *rivets* nearest the edge of a sheet shall be about three-eighths of an inch from the edge. Rivets shall be staggered, with not less than 18 rivets to the foot, and shall have countersunk heads. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

*The keels, stems, and sternposts shall be not less than the following sizes:*

| Length of boat. | Width of keel, stem, and stern-post. | Depth of keel, stem, and stern-post. |
|---|---|---|
| | *Inches.* | *Inches.* |
| Not over 18 feet | 1.8 | 4.2 |
| Over 18 and not over 20 feet | 2.0 | 5.0 |
| Over 20 and not over 21 feet | 2.1 | 5.0 |
| Over 21 and not over 22 feet | 2.2 | 5.0 |
| Over 22 and not over 23 feet | 2.3 | 5.0 |
| Over 23 and not over 24 feet | 2.4 | 5.0 |
| Over 24 and not over 25 feet | 2.5 | 5.0 |
| Over 25 and not over 26 feet | 2.6 | 5.0 |
| Over 26 and not over 27 feet | 2.7 | 5.0 |
| Over 27 and not over 28 feet | 2.8 | 5.0 |

The keels of all boats over 26 feet long shall be strengthened by the addition of a main *keelson* extending not less than two-thirds the length of the boat and having one-half the area of the main keel, to which it shall be through fastened with $\frac{3}{8}$-inch clinch bolts spaced not more than 14 inches.

Steel having one-sixth the sectional area of wood found by the above table may be used in lieu of wood for keels, stems, and sternposts of metallic lifeboats.

All steel keels, stems, and sternposts shall be painted with two coats of red lead and oil.

The shell plates shall be riveted to the steel keels, stems, and sternposts with button-head rivets of not less than three-sixteenths of an inch in diameter for boats less than 24 feet in length, not less than one-fourth of an inch in diameter for boats of 24 feet up to and including 27 feet in length, and not less than five-sixteenths of an inch in diameter for boats from 28 feet up to and including 30 feet in length.

The rivets shall be staggered not less than 12 rivets to the foot.

The shell plating attached to the steel keels, stems, and sternposts shall be laid over flannel or felt and red lead to insure watertightness. Any form of joint insuring the same result may be approved by the supervising inspector of the district in which the lifeboat is built.

*The size of gunwales shall be of not less than the following dimensions:*

| Length of boat. | Depth of gunwale. | Width of gunwale. |
|---|---|---|
| | *Inches.* | *Inches.* |
| Not over 18 feet | $1\frac{3}{4}$ | 2 |
| Over 18 and not over 20 feet | $1\frac{7}{8}$ | $2\frac{1}{8}$ |
| Over 20 and not over 22 feet | 2 | $2\frac{1}{4}$ |
| Over 22 and not over 24 feet | $2\frac{1}{8}$ | $2\frac{3}{8}$ |
| Over 24 and not over 26 feet | $2\frac{1}{4}$ | $2\frac{1}{2}$ |
| Over 26 and not over 28 feet | $2\frac{3}{8}$ | $2\frac{5}{8}$ |

The gunwales of boats not over 22 feet long shall be attached to the thwarts by steel *braces* at least $1\frac{1}{4}$ inches wide by five-sixteenths of an inch thick, teed 4 inches on the thwarts and secured thereto by two one-fourth-inch carriage bolts, and to the gunwales by a one-fourth-inch bolt clinched over the plate on the outside. In

boats over 22 feet long, such steel braces shall be at least 1½ inche by three-eighths of an inch, teed 5 inches on the thwarts and secure thereto by three one-fourth-inch carriage bolts, and to the gunwale by five-sixteenths-inch bolts clinched over the plate on the outside All sheer plates shall come up on the gunwale to within one-half inc of its top and be nailed thereto with 1½-inch boat nails spaced inches.

Angle-bar steel gunwales may be used for all lifeboats when th cross-sectional area of the same is of at least one-sixth the cross-sec tional area of the wooden gunwale as now specified and required subject to the suspension test required of lifeboat when loaded wit its full complement of persons and equipment.

All *nosings* shall be formed of so-called half rounds, mitered to fi fairly against the gunwales and sheer plates, through which they shall be nailed to the gunwales every 6 inches with wire nails of No. 10 gauge and not less than 2¾ inches long. The flat side of nosings on boats of not over 20 feet long shall be not less than 1⅜ inches wide and five-eighths of an inch thick. On boats over 20 feet and not over 24 feet long the flat side of the nosing shall be not less than 1⅝ inches wide and 1 inch thick through the round. On all boats over 24 feet long the flat side of the nosing shall be not less than 2¼ inches wide and 1 inch thick through the round.

All *thwarts* shall be made of clear yellow pine or fir.

In boats not over 20 feet long thwarts shall be at least 1⅛ inches thick by 7½ inches wide. In boats over 20 feet and not over 24 feet long they shall be at least 1¼ inches thick by 8 inches wide. In boats over 24 feet long they shall be 1⅜ inches thick by 9 inches wide. All thwarts over 4½ feet long shall be supported by *stanchions* of pine 1 inch by 5 inches. Every thwart shall be secured at each end to the boat side by a double or U flange of No. 16 plate riveted to the shell with five rivets. The thwarts shall be pushed in between those flanges and secured thereto by five boat nails driven down through the upper flanges, thwarts, and lower flanges, and turned over beneath.

*Breasthooks formed of steel* for boats not over 20 feet long shall be one-fourth inch thick and 1¼ inches wide. In boats over 20 feet and not over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1⅜ inches wide. In boats over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1½ inches wide.

No such breasthooks shall be less than 9 inches long.

Breasthooks shall be fastened through the gunwales each side with three one-fourth-inch button-head bolts clinched over the shell plate All such breasthooks shall be upset in the throat sufficient to allow the upper bolt through the ring strap to pass through the hook without reducing the sectional area thereof.

The *midship footings* in boats not over 18 feet long shall be not less than seven-eighths of an inch thick, and have two footings on each side, which footings shall be seven-eighths of an inch thick by 7 and 5 inches wide, respectively. The midship footings in boats over 18 feet and not over 24 feet long shall be not less than 1 inch thick by 12 inches wide and have three footings on each side, which shall be 1 inch thick by 7, 6, and 4 inches, respectively, in width. The midship footings in boats over 24 feet and not over 26 feet long shall be not less than 1 inch thick and 12 inches wide, and such boats shall have not less than three footings on each side, each to be not less

than 1 inch thick by 7, 6, and 4½ inches, respectively, in width. Boats over 26 feet long having a keelson shall have three footings on each side 1 inch thick by 8, 6, and 5 inches, respectively, in width. All said footings shall be fitted fairly to the bottom over a coat of lead paint and held in place by straps of No. 18 plate, 1⅛ inches wide, riveted with four rivets to the boat shell. The strap shall pass up through an aperature in the middle of each footing and receive a toggle of gas pipe five-eighths of an inch diameter and of a length not less than two-thirds of the width of the footing. There shall be not less than four such toggles in each footing in boats not over 20 feet long, nor less than five such toggles in boats over 20 feet and not over 24 feet long. In boats over 24 feet long there shall be six such toggles in each footing. The midship footings shall be secured to the bottom by straps and toggles in two rows placed 3 inches from each edge of the footing, and fastened with toggles of one-half inch pipe 3½ inches long. Hardwood toggles may be used in lieu of pipe when the same are formed of oak of so-called half rounds, 1 inch on their flat side and three-fourths of an inch thick. Iron or steel of so-called half rounds not less than five-eighths of an inch on the flat side and not less than three-sixteenths of an inch thick may also be used for toggles.

The *tackle rings* in boats not over 18 feet long shall be formed of not less than five-eighths-inch round steel. In boats over 18 feet and not over 22 feet long such rings shall be formed of not less than three-fourths-inch round steel. In boats over 22 feet and not over 26 feet long such rings shall be formed of not less than thirteen-sixteenths-inch round steel. In boats over 26 feet long such rings shall be formed of not less than seven-eighths-inch round steel. Such rings shall be welded through eyes of equal strength in the ring straps, which straps shall have a sectional area on each side of the upper bolt hole equal to that of the ring, and the sectional area of strap on each side of the next bolt hole shall be two-thirds that of such ring, and on each side of the next row of both holes one-half that of such ring. *Hooks* may be allowed in lieu of rings when constructed of equal strength to rings and attached to the boat as securely as the rule provides for rings.

The pitch of bolt holes in all such straps shall be 3 inches.

In boats not over 18 feet long said ring straps shall be secured with three bolts one-half of an inch in diameter. In boats over 18 feet and not over 22 feet in length such ring straps shall be secured by three bolts five-eighths of an inch in diameter. In boats over 22 feet and not over 26 feet long such ring straps shall be secured by four bolts five-eighths of an inch in diameter. In boats over 26 feet long such ring straps shall be secured by five bolts, the upper two of which shall be five-eighths of an inch in diameter and the other three nine-sixteenths of an inch in diameter. The two upper bolts shall be driven through and clinched on the outer edge of the stem and sternpost. The lower bolt or bolts may be driven blunt 3½ inches into the stem and sternpost. The upper bolts shall pass through the breasthooks.

Each and every lifeboat shall be fitted with a *painter ring* properly secured of a size and strength not less than that specified for tackle rings.

All boats shall be fitted with *rudders* made of clear, straight-grained oak or fir, which shall be stiffened across the bottom edge by a piece of wood of the same character, properly nailed.

All gudgeons and pintles shall be strapped to the wood and through fastened, and be so adjusted that the lower pintle will project at least 1½ inches more below its gudgeon than does the upper one.

Each lifeboat shall be fitted with an *automatic plug*.

All the shell plates, air tanks, nails, gunwale braces, rudder braces, and fastenings of metallic boats shall be *galvanized* when said parts are made of steel or iron.

The *gauge* numbers given in Rule III are the Birmingham standard (B. W. G.).

This section shall apply to all metallic lifeboats built after June 30, 1912. (Secs. 4405, 4488, R. S.)

AIR TANKS OF LIFEBOATS.

13. All lifeboats contracted for after September 30, 1912, shall have not more than 50 per cent of the air-tank capacity in the ends of the boat and the remaining capacity shall be located in the side tanks.

After June 20, 1912, the air tanks of all lifeboats shall be entirely independent of the hull or other construction and shall be of suitable noncorrosive material and of a capacity of not less than 1.5 cubic feet for each person allowed in metallic boats and not less than 1 cubic foot for each person allowed in wooden boats. Such air tanks shall be firmly and securely fastened in the hull, and in such manner as will allow them to be temporarily removed, and in no case shall the tanks be punctured or opened for such fastenings. The tops of such tanks shall be thoroughly protected by a grating or platform or by the thwarts or seats. Such air tanks of 6 cubic feet or less shall be constructed of material of a thickness not less than No. 22 B. W. G.; from 6 cubic feet to and including 15 cubic feet, of a thickness not less than No. 20 B. W. G.; and all air tanks of more than 15 cubic feet capacity shall be of a thickness not less than No. 18 B. W. G.

All joints of air tanks shall be properly double riveted and tightly calked or securely hook jointed and efficiently soldered or properly and securely welded, and such air tanks shall be located in such a manner that will permit the lifeboat to be on as near an even keel as possible when flooded with water.

The cubical contents of air space of air tank shall be stamped on the tank where same can be seen when air tank is placed in boat.

All air tanks shall be fitted with a connection of one-half inch outside diameter, for testing purposes.

Before any lifeboat is passed and accepted, the air tanks thereof shall be tested in the presence of an inspector of this Service by an air pressure of not more than 1 pound to the square inch. At each subsequent annual inspection, or oftener if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF WOODEN LIFEBOATS.

14. Wooden lifeboats shall be substantially constructed and in every way equal in strength and stability to a metallic boat built in accordance with the above specifications. (Sec. 4488, R. S.)

CARRYING CAPACITY OF LIFEBOATS.

15. The capacity of all lifeboats not otherwise provided for shall be determined by the following rule: Measure the length and breadth outside of the planking or plating and the depth inside at the place of minimum depth. The depth used in calculating shall not in any case exceed 45 per cent of the breadth. The product of these dimensions multiplied by 0.6 resulting in the nearest whole number shall be deemed the capacity in cubic feet.

To determine the number of persons a boat is to carry, divide the result by 10 for coastwise steamers.

*Example.*

The carrying capacity of a boat 22 feet in length, 6 feet in breadth, and $2\frac{1}{2}$ feet in depth shall be determined as follows:

For ocean steamers,

$$\frac{22\times 6\times 2\frac{1}{2}\times 0.6}{10}=\frac{198}{10}=19 \text{ persons.}$$

Every lifeboat shall have sufficient room, freeboard, and stability to safely carry the number of persons allowed to be carried by the above rule, which fact shall be determined by actual test in the water at the time of the first inspection of the lifeboat, except that where a vessel is carrying lifeboats of different types or capacities, at least one lifeboat of each type or capacity shall be so tested.

SIZE OF BOATS.

16. No lifeboat for use on coastwise steam vessels shall be of less than 180 cubic feet capacity, except that all pleasure steamers, and other steamers not exceeding 1,000 gross tons limited by their certificate of inspection to routes not exceeding 15 miles from any harbor shall only be required to carry one lifeboat of 180 cubic feet capacity. Nothing, however, shall exempt such steamers from carrying the aggregate cubic capacity required by the rules. The minimum capacity of lifeboats for this class of vessels shall be 125 cubic feet.

The supervising inspector of the district may, in exceptional cases, permit lifeboats of less than 180 cubic feet as a substitute for said boat on steamers where the crew is insufficient to properly handle a boat of that size, or where there is lack of space to properly carry so large a lifeboat, but in every such case the steamer shall be provided with one or more lifeboats efficient in character and large enough to carry every person on board, and in no case shall the lifeboat be of less capacity than 125 cubic feet.

*Provided further*, That on steamers of 100 gross tons and under, operating within 5 miles of land, where there is a lack of space to properly carry a boat of 125 cubic feet, the supervising inspector of the district may permit lifeboats of less than 125 cubic feet, provided they are large enough and of suitable character to carry every person on board. (Sec. 4488, R. S.)

STRENGTH AND TEST OF BOATS.

17. Each boat shall be of sufficient strength to enable it to be safel lowered into the water when loaded with its full complement of pe sons and equipment.

At every annual inspection of a passenger vessel every lifeboat sha be tested by lowering to the water, or when it can not be lowered t the water, to a wharf, and loaded to its allowed capacity, evenly dis tributed throughout its length. The boat shall then be lifted clea of the water or wharf to determine that the boat and falls are c sufficient strength. In making the above tests of lifeboats, the weigh of each person shall average at least 140 pounds. When dead-weigh is used, the weight shall be equivalent to at least 140 pounds for eac person allowed. (Secs. 4405, 4488, R. S.)

CARE OF LIFEBOATS.

18. Lifeboats shall be stripped, cleaned, thoroughly overhauled and painted at least once in every year. (Sec. 4488, R. S.)

BOAT-DAVIT FALLS AND RECEPTACLES THEREFOR.

19. It shall be the duty of the master or officer in charge of all ves sels to see that the boat-davit falls shall at all times be in readines for immediate use, and protected from ice, and not painted, and such boat-davit falls on all boats not swung out at boat drills shall be cas loose and overhauled; and it shall be unlawful to stow in any lifeboa articles other than those required by law and regulations. On al steamers over 1,000 gross tons, covered tubs, boxes, or reels shall b provided in which to stow away the boat-davit falls.

Where more than one lifeboat is served under one set of davits means shall be provided that will prevent davit tackles from twistin or capsizing, and that will permit the tackles being readily rounded u for the purpose of launching the remaining lifeboats under such davits: *Provided,* That when davits are equipped with separat tackles for each boat, such nontwisting and noncapsizing device i not required. (Secs. 4405, 4488, R. S.)

MARKING OF LIFEBOATS.

20. All lifeboats shall have the number of boat plainly marked o painted on each bow, in figures not less than 3 inches high. Wher lifeboats are carried on both sides of a vessel, lifeboat No. 1 shall b forward on starboard side of vessel, lifeboat No. 2 forward on por side, lifeboat No. 3 next abaft lifeboat No. 1 on starboard side, life boat No. 4 next abaft lifeboat No. 2 on port side, and so forth, th odd-numbered boats being on the starboard side and the even-num bered boats being on the port side of vessel. All lifeboats shall hav their cubic contents and the number of persons such lifeboat i allowed to carry plainly marked or painted on each bow in letter and figures not less than three-fourths of an inch high. All lifeboat shall also have the number of persons allowed to be carried plainl marked or painted on top of at least two of the thwarts, in letters an figures not less than 3 inches high. When the letters and figure above required are painted on lifeboats, such letters and figures sha be dark on a light ground or light on a dark ground. (Secs. 440 4488, R. S.)

HOW LIFEBOATS MUST BE CARRIED AND DAVITS AND CRANES REQUIRED.

21. All lifeboats on vessels carrying passengers shall, if practicable, be carried under substantial davits or cranes, but if it is not practicable so to carry all the lifeboats required, the remainder shall be stowed near at hand, so as to be easily and readily launched. Such davits, cranes, and necessary gear shall be such as will enable the lifeboats to be lowered to the water in less than two minutes from the time the clearing away of the boats is begun.

Each lifeboat carried under davits shall be provided with two separate davits. When a single crane is properly adapted to lower a lifeboat, it may be allowed to take the place of the two davits. Such davits or cranes, and the blocks and falls thereof, on all passenger vessels, shall be of sufficient strength to carry the boat with its full load.

On and after May 1, 1920, the complete installation of all mechanical boat davits shall be tested and demonstrated for strength and efficiency at the place of manufacture in the presence of an inspector of the Steamboat Inspection Service.

The frame, gear, worms, arms, and all machinery in connection with the operation of the device shall be set up in the shop in the same manner as when installed for use on board the ship and shall be tested in the following manner: A weight equal to the weight of the boat with its equipment and complement of persons that the davit is intended to serve, the weight of the persons being considered as 140 pounds each, shall be suspended from the eye or end of each davit arm, and while the weight is in suspension the davit arm shall be operated from the inboard position to the full outboard position, with the same operating crank or device that is used in actual practice on board the ship. Under this test the davit arm shall show no permanent set or deflection, and the frame, gear, and operating mechanism shall show no distress or distortion. While this test is being conducted, the frame, gear, and operating mechanism, if of cast material, shall be subjected to a test by being well hammered, to satisfy the inspector that the castings are sound and without flaw.

When the assembled installation meets the foregoing requirements and the inspector is satisfied that the device is sufficient in strength and operation, he shall stamp the davit arm and the frame to which it is attached, which shall bear identical numbers of the manufacturer, with the letters "U. S. I.," the initials of his name, and a serial number.

When steel castings are employed for frames or davit arms, the castings shall be thoroughly annealed, and the tensile strength of the castings shall be not less than 58,000 pounds nor more than 78,000 pounds per square inch, with an elongation of not less than 20 per cent in a length of $2\frac{1}{2}$ inches measured on the test piece used in determining the tensile stress. The test piece shall have a section $2\frac{1}{2}$ inches in the center turned down to one-half-inch diameter. An inspector of this service shall witness this test. Sample pieces must be a part of the annealed casting and must represent the casting after it has been thoroughly annealed, and if the casting has afterwards been heated for any purpose it shall be again annealed. The manufacturer shall furnish the inspector, when required, an affidavit

setting forth the fact that the required tests respecting annealin have been fully complied with.

The davit arm, if of cast material, shall be raised to an angle of 45° the lower end resting upon the ground, and dropped on a har unyielding base, and then slung up and subjected to a test by bein well hammered with a sledge hammer not less than 7 pounds i weight, to satisfy the inspector that the casting is sound and withou flaw. An inspector of the Steamboat Inspection Service shall b present at the foundry where such castings are made, and when th foregoing specifications and tests referred to in this paragraph hav been compiled with to his satisfaction, he shall stamp the davit arm and the davit frame with the letters "U. S. I.," the initials of hi name, and the letters "F. T.," indicating that the foundry tests hav been complied with.

No davit arm or frame comprising mechanical davits shall b placed on board any vessel until all these requirements have beer fully complied with.

After October 31, 1926, all cast-steel mechanical davits carried in stock, which have not been tested as above described, shall be sub jected to the drop, hammer, suspension, and turning-out tests, and stamped by an inspector, all as above described, before such davits are accepted as lawful equipment. (Secs. 4405, 4488, R. S.)

### LIFEBOATS AND LIFE RAFTS KEPT CLEAR FOR LAUNCHING.

22. The decks on which lifeboats of any class or life rafts are carried shall be kept clear of freight or any other obstruction that would interfere with the immedi te launching of the lifeboats or life rafts. (Secs. 4405, 4488, R. S.)

### HANDLING OF THE BOATS AND RAFTS.

23. All the boats and rafts must be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the boats and rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements must be such that it may be possible to launch on either side of the vessel as large a number of boats and rafts as possible.

### CHARLES R. M'COTTER LIFEBOAT.

24. Lifeboats of this type, 13 feet in length, 1 foot 10 inches in height, and 4 feet in width, shall be allowed to carry eight persons. The number of persons allowed to be carried on boats of this type of other dimensions shall be determined, after an actual demonstration by the supervising inspector of the district in which the boat is accepted. In all cases the air tanks in such boats shall be constructed in accordance with the rules and regulations for air tanks. (Sec. 4488, R. S.)

BRUDE LIFEBOAT.

25. Lifeboats of the Brude type, of the sizes specified below, for use on cargo steamers, shall be allowed the following rating:

| Length. | Height. | Width. | Number of persons carried and allowed on cargo steamers. |
|---|---|---|---|
| *Feet.* | *Ft. in.* | *Ft. in.* | |
| 18 | 8 0 | 8 0 | 34 |
| 14 | 6 9 | 6 9 | 17 |

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

INCLOSED LIFEBOATS.

26. All steamers carrying passengers shall be equipped with at least one lifeboat of approved open standard type. Where two lifeboats are required, one of the same may be of an approved inclosed type. Where three or more lifeboats are required, two of such lifeboats shall be of approved open standard type, one to be carried on each side under davits. In no case shall the lifeboat equipment of any steamer consist of more than 50 per cent of approved lifeboats of inclosed type.

When the approved inclosed type of lifeboats is carried on steamers other than those carrying passengers, such steamers shall also be equipped with one lifeboat of approved open standard type of not less than 180 cubic feet capacity. (Sec. 4488, R. S.)

NEWCOMB INCLOSED LIFEBOAT.

27. Lifeboats of this type, 26 feet in length, 6 feet 4 inches in breadth, and 3 feet 4 inches in depth, when constructed in accordance with the rules for lifeboats, shall be allowed to carry 25 persons.

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

LUNDIN LIFEBOATS.

28. *Lundin decked lifeboats* shall be rated and accepted as lifeboats under davits and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic foot.}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = Depth from top of keel to top of gunwale, in feet.

Library
Pacific Salmon
U. S. Fish & Wild

*Example.*

28 feet × 9.5 feet × 2.5 feet × 0.9 = 598.5 cubic feet.
Allow 10 cubic feet to a person, 598.5 ÷ 10 = 59 persons.

*Provided,* That when the Lundin decked lifeboat is loaded to it full capacity the water-tight deck shall be not less than 2 inch above the load water line, and shall have an excess buoyancy i air space and fenders of not less than 25 per cent of the combine weight of boat and load. Not less than 10 per cent of the tot buoyancy shall be in fenders of buoyant material firmly secured t the outside of the boat.

The following example is given in explanation of the above provis

*Example.*

26 feet, 50 persons, Lundin decked lifeboat.

Height of load water line, 15 inches. Required height of inne deck = 15 inches + 2 inches = 17 inches. Combined weight of boa and load (each person allowed figured at 165 pounds), 12,250 pound Excess buoyancy required in air space and fenders abov = 0.25 × 12,250 = 3,062.5 pounds. Total buoyancy required, i. e buoyancy of air space below water-tight deck plus buoyancy of entir fenders, = 12,250 + 3,062.5 = 15,312.5 pounds. Buoyancy required i entire fenders = 0.10 × 15,312.5 = 1,531.25 pounds.

The carrying capacity of the Lundin *power* lifeboat shall be deter mined by the same rule as the Lundin decked lifeboat, with prope reduction for the weight and space used for the motors, tanks for fue and wireless apparatus.

The carrying capacity of the Lundin *housed* lifeboat shall be deter mined by the same rule as the Lundin decked lifeboat.

*Lundin semidecked lifeboats* shall be rated and accepted as lifeboat under davits and may be placed in nests of two under a single pa of davits, but such nesting shall not commence until each set o davits as required by law is first fitted with a required lifeboa They shall be fully equipped as lifeboats as required by these rule and regulations and shall be measured in accordance with the follow ing formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic feet.}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

*Example.*

20 feet × 7 feet × 2 feet × 0.9 = 252 cubic feet.
Allowing 10 cubic feet to a person, 252 ÷ 10 = 25 persons.

*Provided,* That the length of the Lundin semidecked lifeboat do not exceed 24 feet; that the above boat is provided with independen air tanks, placed at the sides of the boat, built in accordance with th general rule for air tanks of lifeboats and with a capacity of not le than $1\frac{1}{2}$ cubic feet for each person allowed; that the above boat provided with built-in water-tight compartments, one in each en and provided with a water-tight manhole, and that not less than 1 per cent of the volume of the displacement to the load water line sha

be in fenders of buoyant material firmly secured to the outside of the boat.

The Lundin *open* lifeboat with balsa wood fenders, 24 feet in length, 7 feet 1 inch in breadth inside fender, 8 feet in breadth outside fender, and 3 feet 2 inches in depth, shall be allowed to carry 40 persons. The number of persons allowed to be carried on boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488 R. S.)

## LIFE RAFTS.

### DRAWINGS, SPECIFICATIONS, NAME PLATE, AND HOW MARKED.

29. All life rafts shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the life rafts are built.

Builders of life rafts shall furnish the supervising inspector of the district in which the life rafts are built drawings, or blue prints, and specifications, showing and explaining the construction of same and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation in a length of 4 inches of at least 20 per cent when the thicknesss of the metal is of or greater than No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of life rafts shall affix a plate or other device to each life raft, having thereon the builder's name, number of raft, date of construction of raft, cubical contents of raft, and number of persons said raft will carry, as determined by the rules of the Board of Supervising Inspectors.

There shall be stenciled in a conspicuous place on each life raft now in use the number of persons said raft can carry, as hereinafter provided. (Secs. 4405, 4488, R. S.)

### INSPECTION OF LIFE RAFTS WHEN BUILT.

30. Supervising inspectors of districts where life rafts are built shall detail an assistant or local inspector to any place where life rafts are being built, whose duty it shall be to carefully inspect and examine the construction of such life rafts, and he shall satisfy himself that such life rafts are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the raft he shall stamp his initials, together with the letters "U. S. I.," on a blank space on the plate required to be affixed to the raft by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the raft has been constructed in accordance with the drawings, or blue prints, and specifications on file.

This section shall apply to all life rafts constructed after June 30, 1912. (Secs. 4405, 4488, R. S.)

### CONSTRUCTION OF RAFTS OF THE CATAMARAN TYPE.

31. All metal life-raft cylinders of more than 15 feet in length or of more than 16 inches in diameter shall be constructed of metal not

less than No. 18 B. W. G. No life-raft cylinders shall be of less thickness of metal than No. 20 B. W. G.

The retaining bands which secure the cylinders to the frames shall be made in halves, so that the cylinders may be detached without difficulty and without disassembling the body of the raft, for the purpose of inspection, cleaning, and painting, as required by section 32. Wooden guards and gunwales shall be secured to the retaining bands by angle-iron clips or by the jaws of the retaining bands. Iron rods extending across the raft at top and bottom shall pass through the gunwale and its securing clips or jaws at each end of the raft. The ends of the rods shall be properly secured with a screw nut inside and outside of the gunwale.

All such cylinders shall be divided by water-tight bulkheads into not less than three compartments of equal lengths. Cylinders over 9 feet in length shall be divided into equal lengths by water-tight bulkheads into not less than one compartment for every 3 feet of its length. One of such bulkheads shall be at the extreme end of each cylinder or as near thereto as the flange of cone or bumped ends will permit. Each compartment shall be provided with a suitable air-pump connection of one-half inch outside diameter, fitted with air-tight cap.

Only countersunk-headed rivets shall be used in the construction of metallic life rafts.

All seams and joints shall be properly double riveted.

The above provisions of this section shall take effect only as to life rafts constructed after December 31, 1908.

The circumferential as well as the longitudinal seams of life-raft cylinders shall be riveted and tightly calked, or securely hook jointed and efficiently soldered, or properly and securely welded on rafts constructed after June 30, 1905. Such longitudinal seams shall be secured by not less than 12 rivets to each foot, circumferential seams by not less than 10 rivets to each foot, and bulkheads by not less than 8 rivets to each foot. Bulkhead flanges may be single riveted. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders of metallic life rafts shall be substantially built and capable of resisting the strain which tends to break the cylinders apart when the raft is broadside on in surf or seaway. (Sec. 4488, R. S.)

TESTS OF AIR TANKS OF LIFE RAFTS.

32. Before any life raft is passed and accepted the air tanks thereof shall be tested in the presence of an inspector of this Service by an air pressure of not more than 1 pound to the square inch. At each subsequent annual inspection, or oftener if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Sec. 4488, R. S.)

CARE OF LIFE RAFTS.

33. All life rafts shall be stripped, cleaned, painted, and thoroughly overhauled at least once in every year, and inspectors shall carefully

examine at all inspections the material which supports the platform of all life floats in order to determine to their satisfaction that the strength is maintained. If it is found that deterioration has begun, it shall be corrected even to the extent of requiring the renewal of the platform-supporting device. (Secs. 4405, 4488, R. S.)

APPROVED LIFE RAFTS.

34. Any type of life rafts approved by the Board of Supervising Inspectors shall be considered as equivalent to the standard raft above specified. (Sec. 4488, R. S.)

CARRYING CAPACITY OF LIFE RAFTS.

35. No type of raft may be approved for coastwise steam vessels unless it satisfies the following conditions:

First. It should be reversible.

Second. It should be of such size, strength, and weight that it can be handled without mechanical appliances, and, if necessary, be thrown from the vessel's deck.

Third. It must have not less than 3 cubic feet of air cases or equivalent buoyancy and not less than 3 square feet of deck surface for each person allowed. Rafts already in use may have the rating changed by the supervising or local inspectors of the district where the same are being used to meet these requirements and allowances.

Fourth. The air tanks or equivalent buoyancy should be placed as near as possible to the sides of the raft.

At least one-half of the number of life rafts on all steam vessels shall have a capacity exceeding 15 persons.

*Tule* and all other types of catamaran life rafts shall meet the requirements herein specified.

CATAMARAN TULE LIFE RAFTS.

36. Catamaran tule life rafts of the sizes specified below shall be allowed the following rating:

| Length. | Diameter of cylinders. | Number of persons allowed. |
|---|---|---|
| *Feet.* | *Inches.* | |
| 8 | 20 | 8 |
| 12 | 20 | 12 |
| 16 | 20 | 17 |
| 18 | 20 | 18 |
| 20 | 20 | 20 |

Catamaran tule life rafts having cylinders of a smaller diameter than specified above shall be tested by the local inspectors of the district in which they are built to determine the number of persons allowed to be carried by such rafts, which test shall consist of a practical demonstration. (Sec. 4488, R. S.)

CLARK LIFE RAFTS.

37. Clark life rafts shall be constructed, tested, and rated in accordance with the following specifications:

All cylinders of more than 16 inches in diameter shall be constructed of metal not less than No. 18 B. W. G., and no cylinder shall

be of less thickness of metal than No. 20 B. W. G. Cylinders shall provided with a suitable air-pump connection of one-half inch ou side diameter, fitted with air-tight cap.

The inspection of life rafts shall include the testing of each co partment by air pressure.

The circumferential as well as the longitudinal seams of cylinde shall be riveted and tightly calked, or securely hook jointed and ef ciently soldered, or properly and securely welded. Such longitud nal seams shall be secured by not less than 12 rivets to each foo circumferential seams by not less than 10 rivets to each foot, a bulkheads by not less than 8 rivets to each foot.

Only countersunk-headed rivets shall be used in the constructi of cylinders. The diameter of shank of rivets shall be not less th No. 10 B. W. G.

The framework connecting the cylinders shall be substantial built and capable of resisting the strain which tends to break t raft apart when the raft is broadside on in surf or when in seawa

There shall be allowed for each person carried not less than 3 cub feet of air space and a deck area of not less than 4 square feet.

On and after May 1, 1917, the iron or steel bolts and nuts used in t construction of Clark rafts for service on salt water shall be ga vanized. Nuts shall not be countersunk in the wood frame, b shall be protected by a wooden batten properly fitted over the nu and fayed neatly to the frame. (Sec. 4488, R. S.)

A B C LIFE FLOATS.

38. The A B C life float shall be allowed for use upon vessels und the jurisdiction of the Steamboat-Inspection Service, and upon a waters, except offshore ocean service, when constructed in accordan with the blue prints and specifications submitted, and allowed capacity in accordance with the following table:

| No. of float. | Dimensions of float. | | Diameter of cylinder. | Number of persons allowed. |
|---|---|---|---|---|
| | Length. | Width. | | |
| | *Ft. In.* | *Ft. In.* | *Inches.* | |
| 1 | 5 0 | 2 6 | 6 | 5 |
| 2 | 7 0 | 3 6 | 8 | 10 |
| 3 | 7 6 | 3 6 | 9 | 14 |
| 4 | 8 6 | 4 0 | 10 | 15 |
| 5 | 8 0 | 5 0 | 10 | 20 |
| 6 | 8 9 | 4 9 | 11 | 25 |
| 7 | 10 0 | 6 0 | 13 | 40 |
| 8 | 12 0 | 8 0 | 15 | 60 |

The cylinder shall be made of solid, encysted balsa wood, we treated with Marr's process in finished state, so as to insure buoyanc Cylinder shall be covered with heavy canvas, and suspended from t cylinder shall be a strong, substantial net, at the bottom of which fixed a platform of sufficient strength to sustain the number persons allowed.

The A B C float shall be capable of sustaining for a continuou period of 24 hours a load placed upon the submerged platform at least 20 pounds for each person that the float is allowed in accor ance with the table. The A B C floats shall be carefully inspecte tested, and marked by inspectors of this service, in accordance wi

he requirements of Rule III governing such inspection, testing, and narking. (Sec. 4488, R. S.)

39.

CARLEY LIFE FLOATS.

| No. of float. | Size of float. | Diameter of tube. | Minimum number of compartments. | Number of persons carried and allowed. |
|---|---|---|---|---|
| | | *Inches.* | | |
| 1 | 8 by 4 feet | 14¼ | | 10 |
| 2 | 8 by 5 feet | 16½ | | 11 |
| 3 | 10 by 6 feet | 17½ | | 18 |
| 4 | 12 by 8 feet | 20½ | | 33 |
| 5 | 3 feet 6 inches by 6 feet | 12 | 8 | 6 |
| 6 | 3 feet 9 inches by 6 feet 6 inches | 13 | 8 | 7 |
| 7 | 4 by 7 feet | 14 | 8 | 9 |
| 8 | 4 feet 6 inches by 7 feet 6 inches | 14 | 10 | 11 |
| 9 | 4 feet 6 inches by 8 feet 6 inches | 14 | 12 | 13 |
| 10 | 5 by 8 feet | 14 | 12 | 13 |
| 11 | do | 15 | 12 | 13 |
| 12 | 5 by 9 feet | 15 | 14 | 16 |
| 13 | 5 by 10 feet | 15 | 14 | 17 |
| 14 | 6 by 10 feet | 16 | | 28 |
| 15 | 6 feet 6 inches by 10 feet 6 inches | 17 | | 31 |
| 16 | 7 by 12 feet | 18 | | 41 |
| 17 | 8 by 12 feet | 19 | | 45 |
| 18 | 9 by 14 feet | 20 | | 67 |
| 19 | 5 by 8 feet | 14½ | | 18 |
| 20 | 5 by 10 feet | 15½ | | 20 |

CAMBRIDGE LIFE FLOATS.

The Cambridge life float, 9 feet in length and 6 feet 6 inches in width, shall be allowed a capacity of 25 persons. Other sizes of the same type shall be allowed a capacity comparing approximately with the above capacity, which shall be determined by the supervising inspector of the district where the float is manufactured after an actual demonstration. Additional sizes approved: 5 feet wide, 8 feet long, inner diameter 13 inches, allowed 16 persons; 7 feet wide, 11 feet long, inner diameter 15 inches, allowed 38 persons; 6 feet wide, 10 feet long, 15 inches inside diameter of tube, allowed 18 persons. (Sec. 4488, R. S.)

USE OF BARSTOW LIFE RAFT PROHIBITED.

40. The use of the Barstow life raft is prohibited on vessels on any waters after February 28, 1914. (Sec. 4488, R. S.)

CAPACITY AND ALLOWANCE OF ENGELHARDT COLLAPSIBLE LIFEBOATS.

41. Engelhardt collapsible lifeboats may be carried as lifeboats and rated as class 2C, and shall be fully equipped as lifeboats as required by these rules.

The cubic capacity of Engelhardt collapsible lifeboats shall be determined in accordance with the following rule: Measure in feet and fractions of a foot the length and breadth outside of canvas extension and the depth inside at the place of minimum depth taken from the inside of the bottom planking of the bottom to the top of gunwale when extended. The product of these dimensions multiplied by 0.7 shall be deemed the capacity in cubic feet. (Sec. 4488, R. S.)

HANDLING OF THE RAFTS.

42. All rafts must be stowed in such a way that they can b launched in the shortest possible time and that, even under unfavo able conditions of list and trim from the point of view of the handlin of the rafts, it may be possible to embark in them as large a numbe of persons as possible.

The arrangements must be such that it may be possible to launc on either side of the vessel as large a number of rafts as possible.

EQUIPMENT FOR LIFE RAFTS AND LIFE FLOATS.

43. All life rafts on coastwise steam vessels shall be equipped a follows:

A properly secured life line entirely around the sides and ends o the raft, festooned to the gunwales in bights not longer than 3 fee with a seine float in each bight.

One painter of manila rope of $2\frac{3}{4}$ inches in circumference, and o suitable length.

Four oars.

Five rowlocks properly attached.

One boat hook attached to a staff of suitable length.

One self-igniting life-buoy light.

One sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water, and so arranged that it can be attached to the sea anchor.

A water-tight receptacle, containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread o United States Army ration. The receptacle shall be of metal and fitted with an opening in the top not less than 5 inches in diameter properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

A water-tight receptacle containing 1 quart of water for each person

Two enameled drinking cups.

A water-tight metal case containing six self-igniting red lights capable of burning at least two minutes.

A water-tight box of matches.

All loose equipment must be securely attached to the raft to which it belongs.

All life floats on coastwise steam vessels shall be equipped as follows:

A properly secured life line entirely around the sides and ends o the float, festooned to the gunwales in bights not longer than 3 feet with a seine float in each bight.

One painter of manila rope of $2\frac{3}{4}$ inches in circumference and o suitable length.

Four paddles.

One boat hook attached to a staff of suitable length.

One self-igniting life-buoy light.

A water-tight metal case containing six self-igniting red lights capable of burning at least two minutes.

All loose equipment must be securely attached to the float to which it belongs. (Sec. 4488 R. S.)

CERTIFICATED LIFEBOAT MEN—MANNING OF THE BOATS.

44. There shall be for each boat or raft a number of lifeboat men at least equal to that specified as follows: If the boat or raft carries 25 persons or less, the minimum number of certificated lifeboat men shall be 1; if the boat or raft carries 26 persons and less than 41 persons, the minimum number of certificated lifeboat men shall be 2; if the boat or raft carries 41 persons and less than 61 persons, the minimum number of certificated lifeboat men shall be 3; if the boat or raft carries from 61 to 85 persons, the minimum number of certificated lifeboat men shall be 4; if the boat or raft carries from 86 to 110 persons, the minimum number of certificated lifeboat men shall be 5; if the boat or raft carries from 111 to 160 persons, the minimum number of certificated lifeboat men shall be 6; if the boat or raft carries from 161 to 210 persons, the minimum number of certificated lifeboat men shall be 7; and, thereafter, 1 additional certificated lifeboat man for each additional 50 persons: *Provided,* That if the raft carries 15 persons or less a licensed officer or able seaman need not be placed in charge of such raft: *Provided further,* That one-half the number of rafts carried shall have a capacity of exceeding 15 persons.

The allocation of the certificated lifeboat men to each boat and raft remains within the discretion of the master, according to the circumstances.

By "certificated lifeboat man" is meant any member of the crew who holds a certificate of efficiency issued under the authority of the Secretary of Commerce.

In order to obtain the special lifeboat man's certificate the applicant must prove to the satisfaction of an officer designated by the Secretary of Commerce that he has been trained in all the operations connected with launching lifeboats and the use of oars; that he is acquainted with the practical handling of the boats themselves; and, further, that he is capable of understanding and answering the orders relative to lifeboat service.

MANNING OF BOATS.

45. A licensed officer or able seaman shall be placed in charge of each boat or pontoon raft; he shall have a list of its lifeboat men, and other members of its crew which shall be sufficient for her safe management, and shall see that the men placed under his orders are acquainted with their several duties and stations.

A man capable of working the motor shall be assigned to each motor boat.

The duty of seeing that the boats, pontoon rafts, and other life-saving appliances are at all times ready for use shall be assigned to one or more officers.

LIFE PRESERVERS.

46. Every vessel inspected under the provisions of Title LII, Revised Statutes of the United States, shall be provided with one good life preserver, having the approval of the Board of Supervising Inspectors, for each and every person carried, and every vessel carrying passengers shall have in addition thereto a number of life preservers suitable for children equal to at least 10 per cent of the total number of persons carried.

Every life preserver adjustable to the body of an adult person, manufactured after February 10, 1923, shall be of the reversible type,

made of suitable material approved by the Board of Supervising Inspectors, with straps properly attached on each side of the body of the life preserver (thus making it reversible), with recesses under the arms, thereby allowing the front and back sections to fit around the upper part of the wearer, and held in place by the straps, and the upper part of the life preserver shall be made vestlike, the whole so constructed as to place the main buoyant body of the device underneath the shoulders and around the body in a manner that it will support the person wearing it in an upright or a slightly backward position.

All such life preservers shall be not less than 52 inches in length when measured laid flat, and every life preserver shall be capable of sustaining for a continuous period of at least 24 hours an attached weight so arranged that whether the said weight be submerged or not there shall be a direct downward gravitation pull upon said life preserver of at least 20 pounds.

All life preservers shall be covered with uncolored material without filling or sizing, of sufficient weight and strength to fully protect the contents, such material to be unbleached cotton drill or twill of not less than 6 ounces in weight to a section of 30 by 36 inches. Such covering on the body of each life preserver shall be of one piece only, and the outside longitudinal edge of the covering seam shall be turned to a roll and closely rope stitched: *Provided*, That the material used in construction of the vestlike top may be made of separate pieces of like material of the same weight, gored to fit, and securely sewed by a double row of stitching to top of such life preserver: *Provided further*, That vivatex may be used as a cover for life preserves when such material is of a weight not less than 10.2 ounces per square yard.

The straps or other approved means of securing the life preserver about the body of the wearer shall be of double-woven cotton tape of 1¼ inches width with two selvage or cord edges, of 175 pounds tensile strength, extending along both sides of the life preserver and secured thereto in a permanent manner, so as to make such life preserver reversible, the ends of the straps extending 12 inches beyond the ends of the jacket: *Provided*, That when it becomes necessary to replace belt straps on life preservers of the single-belt type, it shall be done in the foregoing manner so as to make such repaired life preservers reversible.

All thread used in the construction of life preservers shall be of a size and strength not less than Barbour's linen, three-cord, No. 25 machine thread, and any thread other than linen shall be approved by the Board of Supervising Inspectors before being permitted to be used. All seams and other machine sewing on life preservers shall be with a short lock stitch, not less than eight stitches to the inch.

Cork block life preservers shall contain an aggregate weight of 5½ pounds of good cork in the body thereof, and where the blocks are made up of separate pieces, said pieces shall be fastened with non-corrosive materials.

Blocks of compressed cork when used in life preservers shall weigh in the aggregate not less than 5½ pounds in the body thereof, and shall be so constructed that said blocks will sustain, without disintegration or substantial expansion, a submersion test satisfactory to the inspector examining the same, and that at the expiration of such test shall have the buoyancy above required.

Blocks of balsa wood or sheaves of tule when used in life preservers all fulfill the same requirements as for life preservers constructed of lid or compressed cork as to construction, material in cover, straps, id thread, and be subjected to similar tests for buoyancy.

The edges, corners, and outside surface of block material used in the nstruction of life preservers shall present a smooth surface to guard gainst undue destruction of the covering material and present suit- ble smooth surface for legible stenciling and stamping by the spectors making the inspection.

When a kapok collar is provided, it shall be filled with prime Java apok, efficiently tufted, such collar filling to weigh at least 10 nces, and every such kapok collar shall be capable of sustaining r a continuous period of at least 48 hours an attached weight so ranged that whether the weight shall be submerged or not there all be a direct downward gravitation pull of at least eleven times e weight of the completed collar or collar sample undergoing the st. Such kapok supporting collars and all other supporting collars all be subjected to buoyancy test separate and independent to that the test required for the body of the life preserver.

Every new type of life preserver submitted to the Board of Super- sing Inspectors for approval shall be accompanied by specifications, ue prints, or drawings, in triplicate, and no such type of life pre- rver shall be approved without an actual satisfactory service test ing witnessed by the Board of Supervising Inspectors.

All life preservers shall be marked with the name and address of e manufacturer.

After September 2, 1921, no life preserver shall be passed at the ctory inspection which does not fulfill the foregoing requirements, t life preservers now in use or already passed at factory inspection ay be used on board vessels, provided they are constructed in cordance with the laws and regulations in force up to the date of ptember 2, 1921, and are in good and serviceable condition: *ovided*, That life preservers that have deteriorated to the extent of quiring new covers may be used upon vessels under the jurisdiction this Service when reconstructed in a manner to conform in every rticular with the foregoing requirements.

Inspectors are required to direct such life preservers to be dis- buted throughout the cabins, staterooms, berths, and other places nvenient for passengers on such steamers, and there shall be a *inted notice* posted in every cabin and stateroom and in conspicuous aces about the deck informing passengers of the location of life eservers and of the mode of applying or adjusting the same. Life eservers on passenger, excursion, and ferry steamers when stowed erhead shall be so supported that they can be quickly released d distributed among the passengers, and the inspector shall satisfy mself as to the efficiency of the means used for such purpose by tual experiment; and when such life preservers are stowed over- ad at a height greater than 7 feet from the deck below efficient eans shall be provided for such immediate release and distribution be operated by persons standing on the deck below.

The supervising inspector of the district shall detail a local or sistant inspector to any place where life preservers are manufac- red, whose duty it shall be to test and examine all life preservers anufactured at that place and satisfy himself that such life preservers e in accordance with the requirements of the Board of Supervising

Inspectors. When found to be in accordance with the requiremen the inspector shall stamp them with a stamp bearing the initials of l name and the date of examination and certifying that they have be examined and passed. When life preservers are so stamped, it sh be prima facie evidence that they comply with the requirements law and regulations as to their original construction, and they m thereafter be accepted by inspectors, in their discretion, as being accordance with the rules and regulations of the Board of Supervisi Inspectors. Any life preserver of a type that has been approved the Board of Supervising inspectors subsequent to 1922 may examined and passed as provided for by this paragraph after t same has had the approval of the supervising inspector of the distri in which it is manufactured, and every manufacturer of such l preservers shall furnish 12 sets of blue prints or drawings and speci cations to the said supervising inspector, one of which shall be fo warded to the bureau, and one to each supervising inspector.

At each annual inspection of any vessel, and oftener if deem necessary, it shall be the duty of the inspectors making the inspecti to examine and inspect all life preservers in the equipment of su vessel and satisfy themselves (or himself) that such life preserve are in accordance with the requirements of the Board of Supervisi Inspectors: *Provided*, That when any block of compressed cork us in a compressed-cork type life preserver is found to be in a brok or granulated condition, such compressed-cork block shall be co demned as unfit for further use. When found to be in accordan with the requirements, the inspector shall plainly stamp them wi a stamp bearing the word "Passed," his initials, the inspector's po and the date of approval: *Provided*, That at the annual inspection a vessel, or oftener, if necessary, at least 5 per cent of all *kapok l preservers*, or such greater number as may be deemed necessary desirable, shall be subjected to a buoyancy test, as follows: Life pr server containing kapok as buoyant material in the body there if for the use of adults, shall be subjected to a test for buoyancy being entirely submerged for a period of two hours, after which shall be capable of sustaining in water an attached weight having actual downward gravitation pull of 20 pounds when the weight submerged, and kapok life preservers with kapok collars shall subjected to a similar test, except that the attached weight sh have an actual downward gravitation pull of 28 pounds when t weight is submerged. The test for children's life preserver shall the same as the test for adult's life preserver, except the final test f buoyancy, which shall be by a submerged weight of 10 pounds for l preserver without collar and 14 pounds for life preserver with coll Any such life preserver failing to meet the required test shall be imm diately condemned and removed from the vessel's equipment, and a f detailed report of every such failure shall be immediately forward to the supervising inspector of the district having jurisdiction.

Inspectors inspecting *Government vessels* upon request of a department of the Government may accept life preservers made und the specifications of any department of the Government, and stam same with the inspector's stamp and an additional stamp bearing t legend "U. S." within a circle for identification, with the understan ing that they are not to be used except upon Government vessels a will not be allowed as any part of the equipment of vessels und the jurisdiction of this Service.

Every life preserver for the use of *children* shall be made of suitable aterial approved by the Board of Supervising Inspectors, capable sustaining in water a weight of 10 pounds for a period of 24 hours, d of the same general form of construction as to material and sign as required for an adult life preserver.

Each life preserver shall be marked on the front compartment Adults," if for the use of adults; and "Children," if for the use of ildren; and if of a character suitable for the use of both adults and ildren it shall be so marked.

Life preservers which depend upon *inflation or air compartments* r buoyancy, or which are constructed of *loose granulated material* any other material not approved by the Board of Supervising spectors, shall not be allowed. Any life preserver hereafter proved by the Board of Supervising Inspectors may be accepted lieu of those specified in this section.

KAPOK LIFE PRESERVERS.

Every type of kapok life preserver used on any vessel subject to spection by this Service shall first be approved by the Board of pervising Inspectors. The life preservers receiving such approval all conform in every respect to the sample submitted to the board.

Kapok life preservers to receive the approval of the board shall e simple in design and of a character to support the wearer in an right or slightly backward position. The life preserver shall be led with not less than 1½ pounds of prime Java kapok and shall be itably and efficiently tufted. It shall be tested for buoyancy as llows:

First. At least one life preserver from each lot of 250 shall be se-cted indiscriminately by an inspector of this Service for buoyancy test.

Second. The life preserver shall be submerged in a tank of fresh ater for a period of 48 hours.

Third. The life preserver shall then support in fresh water a bmerged weight of 20 pounds for a period of 24 hours. Whenever fe preservers contain more than 1½ pounds of kapok in the body ereof the buoyant test shall be made in the ratio of 20 pounds to ch 1½ pounds of kapok.

When a kapok collar is provided it shall be filled with prime Java apok, efficiently tufted, such collar filling to weigh at least 10 nces, and every such kapok collar shall be capable of sustaining r a continuous period of at least 48 hours an attached weight so ranged that whether the weight shall be submerged or not there all be a direct downward gravitation pull of at least 11 times the eight of the completed collar or collar sample undergoing the test. ch kapok supporting collars and all other supporting collars shall e subjected to a buoyancy test separate and independent to that of e test required for the body of the life preserver.

All approved kapok life preservers shall be marked with the name d address of the manufacturer. Each life preserver shall be arked on the front compartment "Adults," if for the use of adults; d "Children," if for the use of children; and if of a character suit-ble for the use of both adults and children it shall be so marked.

For each lot of 250 life preservers the manufacturer shall submit the local inspectors of the district in which manufactured an fidavit setting forth the material with which the life preservers

are filled and that the life preservers meet in every respect the r quirements of the General Rules and Regulations of the Board Supervising Inspectors. Every life preserver meeting the abo requirements shall be inspected by an inspector of this Service a stamped with his initials and the date of inspection. (Sec. 448 R. S.)

RING LIFE BUOYS.

47. The minimum number of life buoys with which vessels are be provided is fixed as follows:

Vessels under 100 feet in length, minimum number of buoys, vessels 100 feet and less than 200 feet in length, minimum numb of buoys, 4, of which 2 shall be luminous; vessels 200 feet and le than 300 feet in length, minimum number of buoys, 6, of which shall be luminous; vessels 300 feet and less than 400 feet in lengt minimum number of buoys, 12, of which 4 shall be luminous; vesse 400 feet and less than 600 feet in length, minimum number of buoy 18, of which 9 shall be luminous; vessels 600 feet and less than 8 feet in length, minimum number of buoys, 24, of which 12 shall luminous; vessels 800 feet and over in length, minimum number buoys, 30, of which 15 shall be luminous.

Ring life buoys shall be of solid cork or any other equivale material, shall be of not less than 30 inches outside diameter and n less than 17 inches inside diameter, and shall be capable of sustai ing in fresh water for a continuous period of 24 hours an attach weight so arranged that, whether said weight be submerged or no there shall be a direct downward gravitation pull upon the buoy not less than 31 pounds. The body of the buoy before being cover shall stand a downward gravity pull of 200 pounds, the weight to attached to the buoy body by a sling covering a surface of 2 line inches, without breaking, without rupture of the joints, or witho showing a maximum elongation of internal diameter in excess of inches while the weight is attached after being under this test for period of 30 minutes.

The buoy shall be covered with cloth of sufficient weight a strength to fully protect the body of the buoy. Such material sh be of a strength equivalent to an unbleached single-filling cott duck having a weight of 8 ounces to a section 36 by 36 inches.

The cover shall be constructed and placed on the body of the bu in a substantial manner. All seams and other machine sewing on t buoy shall be with a short lock stitch not less than eight stitches the inch. The inside seam shall be sewed with a rope stitch not le than three stitches to the inch.

Four beckets 2½ inches wide, made from the same material as t covering of the buoy, shall be securely attached to the buoy a spaced an equal distance from each other. A line shall pass throu the beckets, which shall be sewed tightly together to prevent slippin The line shall be manila, three-eighths inch in diameter, three-p medium lay, of good quality, having the ends securely and neat spliced, the line to be festooned in bights around the outer edge the buoy. All thread used in the construction of the buoy shall No. 16, three-cord linen.

When the buoy is made of cork, the cork form shall be construct of sound, buoyant corkwood, in two layers or thicknesses. The co sheets shall be flattened and smoothed so that the back or outsi

hard crust is removed sufficiently to give a smooth surface for gluing. One layer shall be built of segments not to exceed four in number. The other layer may be built of segments not to exceed eight in number. The ends of all segments shall be fitted neatly and glued securely one to the other. The two layers shall be neatly joined and properly and securely dowel-pinned and glued firmly together, with joints staggered or broken. The glue used shall be insoluble in water, and the finished buoy shall stand steaming at a pressure of 2 pounds for a period of 30 minutes without disintegration or other positive indications of the glue losing its adhesive properties. When completed, the outside of the buoy shall be of good, sound corkwood finished to a smooth surface. Any form of construction which will meet the general purposes of the above specifications and requirements may be used after having been approved by the Board of Supervising Inspectors.

The supervising inspector of the district shall detail a local or assistant inspector to any place where cork ring life buoys are manufactured within his district, whose duty it shall be to test and examine all such buoys manufactured at that place. When a cork ring life buoy is found to be in accordance with the requirements of the rules of the Board of Supervising Inspectors, the inspector shall stamp the cork, and, after completion of the buoy, shall stamp the cover with the word "Passed," his initials, the inspection port, and the date of approval. The cork and the cover shall also be stamped by the manufacturer with the name or trade-mark of the manufacturer.

*Balsa-wood A B C ring life buoys* shall be constructed of good, fresh, sound balsa wood and shall be made in two layers with not more than four pieces in each layer, the same to be properly and securely dowel-pinned, and shall be of not less than 30 inches outside diameter and not less than 17 inches inside diameter, and of sufficient buoyancy to sustain the specified weight and give the buoyancy required, and shall be covered with the same weight canvas, stitched, roped, and marked or stamped as required by the specifications for cork ring life buoys.

The use of kapok, rushes, cork shavings, granulated cork, or any other loose granulated material, or compartments which depend on inflation for their buoyancy, is not allowed in the manufacture of ring life buoys.

Ring life buoys shall not be permanently secured in any way, but shall be so placed as to be readily accessible in an emergency. Their location shall be plainly indicated.

One of the buoys on each side of the vessel shall have a life line attached of at least 15 fathoms in length.

*Luminous buoys* are those having attached an efficient self-igniting light which can not be extinguished in water.

### SELF-IGNITING WATER LIGHTS.

48. The self-igniting water lights for ring buoys and life rafts shall consist of a cylinder (with bumped heads or ends) made of good sheet copper of not less than 0.022 inch thick, and shall be so designed as to be nonexplosive, and shall be free from any defects which may affect the serviceability or operation of the light. The cylinder shall be sufficiently weighted in the bottom to recover and maintain

an upright position in the water, and all circumferential and hori zontal seams of the cylinder shall be hook jointed and soldered, an the top circumferential seam shall be flush, so as to prevent th lodgment of water.

The cylinder shall be provided with a plug or other device of suc character that when removed from the cylinder sufficient water wi be admitted to insure the prompt and efficient action of the light regardless of whether the cylinder when first striking the wate becomes completely submerged.

The removal of the plug or device shall be effected by the operatio of a lanyard attached to the buoy and to the plug or device on th cylinder, and shall be so arranged and constructed that the weigh of the buoy when thrown overboard will automatically disengag the plug or device, and will insure that the light will self-ignit within one minute after reaching the surface of the water: *Provided* That on oil-tank steamers the self-igniting water light need not b attached to the ring buoy, but may be placed alongside the buo which it is intended to serve, so that it can be easily and quickl attached to the buoy by means of its lanyard when needed in cas of emergency.

On oil-tank steamers, when self-igniting water lights are not at tached to the ring buoys, a snap hook shall be provided for thi purpose.

The cylinder shall contain calcium carbide (taken from fres stock entirely free from the white powdery substance resulting fron exposure to the air) and calcium phosphide sufficient to create brilliant flame of at least 150 candlepower, which shall be main tained and burn for a continuous period of not less than 4 minutes without emitting obnoxious fumes. If at any time durin this period the flame is extinguished, due to the total submersio of the light, the light shall self-ignite upon coming to the surface.

The self-igniting water lights required for life rafts shall meet th above requirements, except that the plug or device may be remove by manual action instead of by the automatic action of the buo lanyard above referred to.

The cylinder shall be plainly marked with the word "TOP" a its top end and permanently indented or embossed with the nam and address of the manufacturer, the year of manufacture (the us of labels of any description for this purpose is strictly forbidden) and with the statement that the device meets in every way th requirements of the Board of Supervising Inspectors.

On and after July 1, 1924, no type or make of water light will b approved which has not been tested by the Bureau of Standards Department of Commerce, and found to conform in all respects t these requirements.

These rules for water lights shall be effective on and after July 1 1924: *Provided*, That water lights manufactured before April 1 1924, and installed on vessels previous to the application of th present requirements will be allowed to remain in service so long a they are maintained in good and serviceable condition; and in spectors, when inspecting vessels having such water light equipment shall give especial attention to the condition of the water lights, an if there appears any evidence whatsoever of corrosion, such as blis ters and warts under the paint, or where the can is badly abraise

y hard usage or carelessness, the same must be condemned at nce and new water lights of an approved type substituted for the nes so condemned, and the attention of the officers of the vessel nust then be called to the necessity for greater care to be exercised n the preservation of the equipment, and it must be made clear to hem that they will be held strictly accountable to this service for he condition of the same.

LINE-CARRYING GUNS AND EQUIPMENT.

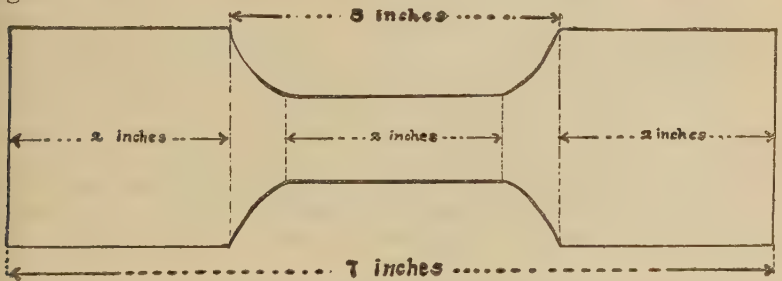
49. All steam vessels of 150 gross tons and over navigating the ocean shall be equipped with at least three line-carrying projectiles nd the means of propelling them, of a type and character which ave been officially approved by the Board of Supervising Inspectors. Sec. 4488, R. S.)

ALLOY OF LYLE-TYPE GUNS.

50. The material entering into the construction of cast-bronze uns for use on board steam vessels as a means of propelling line-arrying projectiles shall have a tensile strength of not less than 2,000 pounds per square inch of section and a reduction of area of ot less than 25 per cent. (Sec. 4488, R. S.)

SAMPLE OF GUN FOR TESTING.

51. At least one sample of the material shall be taken from the asting of each gun, and shall be not less than 7 inches in length, inches in width, one-half inch in thickness, and have a section 0.5 y 0.75 inch over a length of 2 inches, according to the following iagram:




The samples for testing shall be furnished the supervising inspector f the district where the gun is to be tested and must be accompanied y an affidavit of the manufacturer of the gun that the samples ctually and correctly represent the material of the gun. The amples must be distinctly marked with the same number appearing n guns which they represent, so as to be readily identified by the nspector. (Sec. 4488, R. S.)

FIRING TEST OF LYLE AND HUNT GUNS.

52. All line-carrying guns of the cannon type shall be tested in he presence of an inspector by firing three rounds from the gun. One round at least shall carry the regular service projectile, with a ervice line attached, a distance of at least 1,400 feet without break-ng or fouling the line, the performance to be based upon the condi-ons of a reasonably still atmosphere. The other rounds shall be red with not less than the same weight of powder charge, one of hich shall be not less than a weight of 8 ounces, and with projectiles

of the same weight as the service projectile, but no line need b attached: *Provided,* That the distance requirement for the Hun line-carrying gun, small, shall be only 800 feet.

The primer hole fitted in the upper wall of all guns of the canno type manufactured after June 30, 1920, shall be protected by beading, coaming, or projection extending above the wall of the gu not less than one-half inch.

The test rounds required shall be fired from the gun when mounte on its own carriage, lashed as it would be in shipboard use, and whe this test is completed, the gun and its mounting shall show n signs of fracture or damage.

The line shall be coiled, faked, or reeled in its own faking box o reel in such manner that when all the line leaves the container it shal automatically become unattached and free from the container The end of the line intended to be attached to the projectile shal have securely attached thereto a substantial tag bearing a permanen legend which shall indicate its purpose and the other end of the lin shall be tagged in the same manner in order that there may be n delay in securing proper and immediate action of the equipment and the gun, carriage, line box or reel, and projectiles shall all bea the same number and shall be initialed by the inspector, whos report of the test, giving number, date, and result, shall be filed i the office of the supervising inspector of the district in which the tes is made. (Secs. 4405, 4488, R. S.)

STEEL GUNS.

53. Before any steel gun of the cannon type shall be approve the manufacturer shall furnish the supervising inspector of th district where the gun is tested a sample of the material of which it i constructed, such sample to be of the following dimensions: Seve inches in length and approximately 1½ inches wide and 1 inch thick with a section 2½ inches in the center turned down to ½-inch diameter the sample to be accompanied by the same form of affidavit a required for bronze guns. The sample shall show a tensile strengt of not less than 65,000 pounds per square inch of section and a elongation of not less than 20 per cent in a length of 2½ inches. (Sec 4488, R. S.)

AUXILIARY LINES AND PROJECTILES.

54. All steamers required under the law to carry line-carryin projectiles, and the means of propelling them, shall be supplied auxil iary thereto with at least 800 feet of 3-inch manila line for vessels o over 150 and not over 500 gross tons, and 1,500 feet of such line fo steamers over 500 gross tons, and with three approved service line and three projectiles. The auxiliary line and all other equipmen shall be kept always easily and immediately accessible and read for use in connection with the gun and shall not be used for any othe purpose. (Sec. 4488, R. S.)

SHOULDER GUN.

55. The gun known as the "shoulder gun" may be used on steame of 300 tons and under as a means of propelling a line-carrying projec tile. This gun is an ordinary breech-loading rifle with barrel shortene and bore smoothed, using a blank cartridge of 45–70 or 50–7

ropelling a projectile about 8 inches long weighing about 8 ounces, ttached to a line not less than 400 feet in length.

The projectile must be thrown a distance of not less than 250 feet, ithout fouling or breaking the line. The gun shall be of a type pproved by the Steamboat Inspection Service. The manufacturer f the gun shall furnish purchasers with an affidavit that it is of approved type, of safe material, and good workmanship. Each shoulder un shall be provided with three shot lines, 10 projectiles, at least 5 cartridges, and the other necessary equipment. Each vessel sing the shoulder gun shall carry auxiliary thereto, to be used for o other purpose, at least 500 feet of 3-inch manila line. (Sec. 4488, . S.)

SERVICE PROJECTILE LINES AND PROJECTILES.

56. Service projectile lines shall approximate in size the line used y the United States Coast Guard and shall be not less than 1,700 eet in length, made in one continuous length without splice, knot, or ther retarding feature, and must be capable of withstanding a reaking strain of 500 pounds.

The purchaser of service lines shall be furnished a statement by ne dealer or manufacturer that, based upon the test of a sample from ach end of the line, it is of the required strength and that the line as been examined over its entire length and found to be without plice, knot, or other defective feature. A copy of such statement nall be furnished by the purchaser or dealer to the supervising inspecor of the district in which the gun and line are tested.

The container of the line shall bear the name of the manufacturer r dealer, together with the statement that the line in all respects neets the requirements of the Steamboat Inspection Service.

The projectiles shall weigh not less than 18 pounds, be smoothly urned and finished, with a windage of not more than one sixty-ourth of an inch. No such projectile or means of propelling it shall ereafter be approved unless of such a character that the projectile nd propelling charge can be readily withdrawn from the gun when becomes necessary or desirable to do so. Powder containers of enter-fire type shall be of such construction that proper alignment f firing pin and percussion primer always obtains when propelling harge and projectile are set for use. When perforated metal powder ontainers are used, such perforations shall extend entirely around ne base of such containers, and at least 25 efficient primers shall e carried for the firing thereof.

It is recommended that the charge of powder in actual service on hipboard shall be from 5 to 6 ounces, but may be exceeded under xtraordinary circumstances, and in no case shall the charge exceed ounces. The end of the line attached to the projectile should be horoughly wet for a length of about 1 fathom. (Sec. 4488, R. S.)

REPORT OF TEST OF GUN.

57. The supervising inspector shall furnish the manufacturer of ny line-carrying gun a copy of the report on each gun tested and spected. (Sec. 4405, R. S.)

DRILL REQUIRED WITH LINE-CARRYING GUN.

58. The master of every vessel equipped with a line-carrying gun nall drill his crew in the use thereof and fire said gun at least once

in every three months, using one-half the usual charge of powder and any ordinary line of proper length.

It shall be the duty of the inspectors, at the annual inspection, to see that these drills are entered on the log of the vessels. (Sec. 4405, R. S.)

PLACARD CONTAINING INSTRUCTIONS FOR USE OF GUN APPARATUS.

59. A placard containing instructions for using the gun apparatus required by the foregoing section and as practiced by the United States Coast Guard shall be posted in the pilot house, engine room, and in the seamen's, firemen's, and steward's department of every steam vessel required by law to carry such gun apparatus. (Sec. 4405, R. S.)

EXTRA STEERING APPARATUS, LADDERS, STAIRWAYS.

60. Extra steering apparatus consisting of relieving tackles or tiller shall be provided for all steamers: *Provided, however*, That where a steamer is equipped with auxiliary steam or hand steering gear attached to rudder entirely independent of the regular steering gear, same may be used in lieu of the relieving tackles or tiller required.

Every steamer or barge carrying passengers shall be provided with suitable ladders to enable passengers to descend conveniently to the lifeboats and life rafts. One of such ladders shall be provided for each set of boat davits, and kept ready and convenient for use on the boat deck, and shall be long enough to reach from such deck to the vessel's seagoing light water line. All such ladders shall be reversible and free from projections in order that the garments of descending or ascending persons will not become entangled in them.

Every steam vessel shall be provided with sufficient means of escape from the lower to the upper deck, or vice versa, and every steamer of 50 tons or over carrying passengers shall be provided with permanent stairways forward and aft, except where said stairways on towing boats would interfere with towing bitts. (Secs. 4405, 4480, 4484, R. S.)

BULKHEADS.

61. Every seagoing steam vessel constructed after July 1, 1912, carrying passengers, shall have a water-tight collision bulkhead. In vessels not over 200 feet in length this bulkhead shall be located about one-tenth the vessel's length from stem. In vessels over 200 and not over 350 feet in length the collision bulkhead shall be located about one-twelfth the vessel's length abaft the stem. In vessels over 350 and not over 500 feet in length it shall be located about one-fifteenth the vessel's length abaft the stem, and in vessels over 500 feet in length, about one-sixteenth the vessel's length abaft the stem. Such vessels shall also have one water-tight bulkhead forward of and one abaft the engine and boilers, and in addition thereto shall have such other water-tight bulkheads as may be necessary to provide that there shall be no space between the bulkheads to exceed in length one-fifth the length of the vessel: *Provided, however*, That in no case shall the distance between the bulkheads be greater than 80 feet.

Screw steamers shall, in addition to the above-named bulkheads, have located at a suitable distance forward from sternpost a water-

tight bulkhead to protect vessel from disaster in case of fracture of stern pipe.

Sailing vessels of over 700 tons carrying passengers for hire shall have a water-tight collision bulkhead. Such collision bulkhead shall be placed not less than 5 feet from the stem of the vessel.

Wooden steamers carrying passengers whose cargo is restricted to lumber exclusively shall only be required to have a water-tight collision bulkhead as described in the first paragraph of this section; also one water-tight bulkhead forward of and abaft the engines and boilers.

All such bulkheads shall be of iron or steel plates not less than one-fourth inch thick and shall be securely fastened to suitable framework, which framework shall be properly and securely attached to the hull. Such bulkheads shall be strengthened by vertical bars of not less than $3\frac{1}{2}$ by $3\frac{1}{2}$ inch angle iron, spaced not more than 30 inches from center to center, and all steamers that are more than 10 feet deep in any hold shall have horizontal angle irons of not less than 3 by 3 inches on the reverse side, spaced not more than 4 feet from center to center, in addition to the vertical angle irons: *Provided*, That when any bulkheads are constructed of equal strength to the above-described bulkheads they shall be allowed by the local inspectors.

All bulkheads shall reach to the main deck in single-decked vessels, otherwise to the deck next below the main deck, but in every case they shall reach to the deck next above the deep-load line.[2] (Sec. 4490, R. S.)

MEANS OF ESCAPE FROM STEAMERS.

62. On all steamers where the plans and arrangements will possibly permit, all inclosures where passengers or crews may be quartered, or where anyone may be employed, shall be provided with not less than two avenues of escape, so located that if one of such avenues is not available another may be. The locality and arrangement of such additional means of escape shall be determined by the steamboat inspectors and the steamboat managers as will in their judgment best carry out the purposes for which this provision was made. (Sec. 4417, R. S.)

STORM OIL.

63. On and after January 1, 1915, coastwise vessels of more than 200 gross tons propelled by machinery and navigating the oceans or gulfs shall carry a supply of oil for the purpose of smoothing the sea or quelling the force of the waves in case of emergency or necessity in the following quantities:

Vessels of over 200 and not over 1,000 gross tons, 30 gallons.
Vessels of over 1,000 and not over 3,000 gross tons, 40 gallons.
Vessels of over 3,000 and not over 5,000 gross tons, 50 gallons.
Vessels of over 5,000 gross tons shall carry at least 100 gallons.

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[2] SEC. 3. That steam vessels of one hundred tons burden or under engaged in the coastwise bays and harbors of the United States may be licensed by the United States local inspectors of steam vessels to carry passengers or excursions on the ocean or upon the Great Lakes of the North or Northwest, not exceeding fifteen miles from the mouth of such bays or harbors, without being required to have the three water-tight cross bulkheads provided by section forty-four hundred and ninety of the Revised Statutes for other passenger steamers: *Provided*, That in the judgment of the local inspectors such steamers shall be safe and suitable for such navigation without danger to human life and that they shall have one water-tight collision bulkhead not less than five feet abaft the stem of said steamer. (Act approved July 9, 1886.)

This oil shall be accessible and available at all times and the loca tion of the supply and the means and methods of its distribution sha be determined by the master of the vessel. (Sec. 4405, 4417, R. S

STEAMER'S NAME ON EQUIPMENTS.

64. All the equipments of a steamer, such as buckets, hose, axes boats, oars, rafts, life preservers, floats, barrels, and tanks, shall b painted or branded with the name of the steamer upon which the are used. (Sec. 4405, R. S.)

## OCEAN AND COASTWISE.

### Rule IV.—Fire Apparatus.

1. All steamers navigating oceans are required to be provided wit fire buckets and axes, as follows:

| Gross tons. | Buckets. | Axes. |
|---|---|---|
| All steamers not over 10 tons | 2 | |
| All steamers over 10 tons and not over 50 tons | 4 | |
| All steamers over 50 tons and not over 200 tons | 8 | |
| All steamers over 200 tons and not over 500 tons | 16 | |
| All steamers over 500 tons and not over 1,000 tons | 20 | |
| All steamers over 1,000 tons | 25 | |

Fire buckets shall be of a capacity of not less than 3 gallons each but where buckets already installed are of a capacity of less than gallons each they may continue to be used, and fire buckets of th standard size shall be added to provide the total capacity required

Not more than six of the buckets required by this table shall b carried on the upper or boat deck.

Fire buckets shall, when practicable, be constantly filled wit water and in such positions on board as shall be most convenien for extinguishment of fire. (Secs. 4426, 4483, R. S.)

2. All axes shall be located so as to be readily found in time of need shall not be used for general purposes, and shall be kept in good condi tion. (Secs. 4426, 4483, R. S.)

3. All hay, straw, or other inflammable material carried on th open deck of any steamer carrying passengers shall be covered wit a tarpaulin.

All baled cotton shall be securely bound and covered with baggin on at least three-fourths of its surface, including both ends of th bale. No bales of imported or domestic hemp shall be received o any vessel carrying passengers unless the same are properly com pressed, bound with rope, wire, or metalic bands, and covered o ends or sides, according to the several methods now practiced i foreign and domestic trade. (Sec. 4472, R. S.)

4. The main pipes and their branches, on steamers carrying pa sengers or freight, to convey steam from the boilers to the hold an separate compartments of the same shall be not less than 1½ inch in diameter. Steam pipes of not less than three-fourths of an inc in diameter shall be led to all lamp lockers, oil rooms, and lik compartments, which lamp lockers, oil rooms, and compartment in all classes of vessels, shall be wholly and tightly lined with meta

All branch pipes leading into the several compartments of the hold of the vessel shall be supplied with valves, the handles distinctly marked to indicate the compartment or parts of the vessel to which they lead.

These valves or their handles shall be placed in not more than two places on the most suitable and accessible deck of the vessel and so arranged that all can be inclosed in cabinets, boxes, or casings, the doors of which shall be plainly marked with the words "Steam fire apparatus."

On all oil-tank steamers the valves, instead of being located near the hatches on the upper deck, shall be all in an accessible house in which the operator is well protected from heat and smoke: *Provided*, That on oil-tank steamers a main line of steam smothering pipe of sufficient area to supply all branch pipes leading from the same to the tanks may be run the entire length of the deck, and only the main stop valve of the main line shall be required to be housed. All branch pipes shall be provided with valves which shall be left open at all times, so that the steam may enter all compartments simultaneously. Such branches as may not be required after the fire is definitely located may be shut off, in order that the entire system may be concentrated on one tank.

*Provided*, That carbonic-acid gas or other extinguishing gases or vapors may be substituted in place of steam as aforesaid and for the above-described purposes, and may also be used in the fire hold, fireroom bilges, and pump rooms on vessels using oil for fuel, when such gas or vapor and the apparatus for storing, producing, and distributing same shall have been approved by the Board of Supervising Inspectors.

*Provided further*, That pipes for conveying steam from the boilers, or pipes for conveying carbonic-acid gas or other extinguishing vapors for the purpose of extinguishing fire, shall not be led into the cabins or into other passengers' or crew's quarters.

*Provided further*, That in the compartments or oil tanks of oil-tank vessels the foam-type fire-extinguishing system may be substituted for steam, gases, or other extinguishing vapors, and may also be used in the fire hold, fire-room bilges, and pump rooms on vessels using oil for fuel when such foam-type fire-extinguishing system is completely installed in accordance with drawings or blue prints and specifications approved by the supervising inspector of the district where it is installed. The foregoing system may be of a type employing either two-solution tanks or a generator using an approved dry chemical mixture.

Motor vessels of 50 gross tons and over, carrying passengers or freight for hire, shall be equipped with efficient means for extinguishing fire in the hold and the different compartments thereof in which cargo is carried; also in lamp lockers, oil rooms, and like compartments.

The use of glass lamps shall be prohibited on any vessel under the jurisdiction of the Steamboat-Inspection Service unless the same are securely fitted into suitable metal brackets. (Sec. 4470, R. S.)

5. Steamers required to be provided with double-acting steam fire pumps or other equivalents for throwing water shall be equipped with such pumps according to their tonnage, as follows: Steamers over 20 tons and not exceeding 150 gross tons shall have not less

than 50 cubic inches pump-cylinder capacity. Steamers of over 150 gross tons and under 3,000 tons shall have not less than one-third of 1 cubic inch pump-cylinder capacity for every gross ton. Steamers of 3,000 gross tons and over shall have pump cylinder of not less than 1,000 cubic inches capacity. This rule shall apply only to pumps installed after June 30, 1907, and all pumps now approved and in use or installed before said date shall be accepted if complying with requirements of law and regulations in force at the time of the adoption of this rule.

Upon such steamers fire mains shall be led from the pumps to all decks, with sufficient number of outlets arranged so that any part of the steamer can be reached with water with the full capacity of the pumps and by means of a single 50-foot length of hose from at least one of said outlets. On all classes of steamers every such pump shall be fitted with a gauge and a relief valve of such size as to restrict the pressure of water to 100 pounds per square inch. (Sec. 4471, R. S.)

6. Steamers are not restricted to any particular proportions for fire pumps. Any dimensions that will attain the requirements specified in section 5, or greater in capacity, may be allowed: *Provided, however,* That all hydrant connections be supplied with suitable spanners. (Sec. 4471, R. S.)

7. The capacity of the pipes and hose leading from the pumps shall in no case be less than that of the discharge opening of the pump: *Provided, however,* That the pipe and hose shall in no instance be less than 1½ inches in internal diameter.

*And provided further,* That steamers of 15 tons and under may be allowed to use hose of three-fourths of an inch internal diameter, but in no case shall it be less than the discharge opening of the pumps, it being further provided that open boats of less than 10 gross tons that are fully equipped with buckets, as required by these rules and regulations, shall not be required to carry hose. (Sec. 4471, R. S.)

8. A rotary pump, when driven by an engine independent of the main engine, may be considered as an equivalent for the double-acting fire pump and used as such when equal to it in efficiency and capacity. (Sec. 4471, R. S.)

9. Any steamer having on board an independent steam pump and an auxiliary boiler suitably arranged and of sufficient strength and capacity for testing the boilers thereof; or if one of the hand fire pumps be suitably arranged and of sufficient strength and capacity for testing the boilers; or if the "doctor," so called, when arranged permanently for testing the boilers, is, in the judgment of the inspectors, suitable for the purposes intended, may be considered as having complied with the law requiring a pump for testing boilers. (Sec. 4471, R. S.)

10. Any steamer of 50 gross tons or under, required to have a double-acting steam fire pump, and having in use on board a "doctor," so called, may be considered as having a lawful equivalent for such a pump when such "doctor" has pipes attached to it leading to the upper and between decks, such pipes being provided with hose and valves, according to law; but the pipes and hose shall in no case be less than 1½ inches in internal diameter. The pumps for supplying the boilers shall in no case be considered as an equivalent for the double-acting steam fire pump, on steamers above 50 gross tons. Every steamer exceeding 150 gross tons and not otherwise provided

for shall be provided with one good double-acting fire pump to be worked by hand: *Provided*, That when a steam pump is equipped to work by hand the same shall be accepted as a hand fire pump. Each chamber shall be of sufficient capacity and the stroke so regulated that not less than 100 cubic inches of water shall be displaced by each stroke of the piston. Two smaller pumps may be allowed to take the place of the one pump of 100 cubic inches capacity provided for in this section when their combined capacity equals or exceeds 100 cubic inches. Each pump shall be placed in the most suitable part of the vessel for efficient service, having suitable, well-fitted hose to such pump long enough to reach to all parts of the vessel. Pumps may be connected to a pipe line having sufficient number of outlets so arranged that any part of the vessel can be reached with water by means of a single 50-foot length of hose from at least one of said outlets, pumps to be kept at all times in perfect order, with brakes, and hose coupled on ready for immediate use: *Provided*, That on freight steamers having hulls constructed entirely of metal only such hose shall be required as may be necessary to reach all cabins or superstructures, such hose to be coupled on at all times. (Sec. 4471, R. S.)

11. All steam fire pumps required shall be supplied with connecting pipes leading to the hold of the vessel with stopcocks or shut-off valves attached and so arranged that such pumps may be used for pumping and discharging water overboard from the hold.

Each and every steam vessel shall be fitted with a bilge pipe leading from each compartment of the vessel and connecting with a suitably marked valve to the main bilge pump in the engine room, and each compartment of all steam vessels shall be fitted with suitable sounding pipe, the opening of which shall be accessible at all times, except that in compartments accessible at all times for examination no sounding tubes are necessary.

Steam siphons may be substituted in each compartment for the bilge pipes.

All hose required on steam vessels for fire purposes shall be tested to a pressure of 100 pounds to the square inch at each inspection, and it shall be the duty of the local inspectors at each annual inspection to see that the couplings are securely fastened to the hose by suitable external or internal clamps, and at least one length of such hose shall be kept at all times attached to each outlet of the fire main and provided with a suitable nozzle: *Provided*, That on freight steamers where the keeping of such hose coupled on interferes with the loading or unloading of cargo they may be removed during such loading or unloading. (Sec. 4471, R. S.)

12. All pipes used as mains for conducting water from fire pumps on board steam vessels in place of hose shall be of wrought iron, brass, or copper, with wrought-iron, brass, or composition hose connections.

Suction pipes for all pumps on steam vessels shall be so arranged as to have an area of opening sufficiently large to supply water when pumps are working at full capacity.

Motor vessels of 50 gross tons and over, carrying passengers for hire, shall be equipped with pumps for throwing water according to the tonnage as prescribed in section 5, Rule IV, for steam vessels, and equipped as prescribed in the second paragraph of section 5, and sections 6 and 7 of Rule IV. (Secs. 4426 and 4471, R. S.)

FIRE EXTINGUISHERS.

13. All vessels of more than 15 tons, carrying passengers, includ ing pleasure vessels, shall be provided with such number of goo and efficient portable fire extinguishers, approved by the Board o Supervising Inspectors, as shall hereafter be prescribed, viz:

| | Minimum number fire extinguishers. |
|---|---|
| Vessels of over 15 and not over 50 gross tons | |
| Vessels of over 50 and not over 100 gross tons | |
| Vessels of over 100 and not over 500 gross tons | |
| Vessels of over 500 and not over 1,000 gross tons | |
| Vessels of over 1,000 gross tons | |

Freight and towing vessels of over 15 gross tons having hull con structed of metal with metal superstructure shall be provided wit chemical fire extinguishers as hereinafter described, viz:

| | Minimum number fire extinguishers. |
|---|---|
| Vessels of over 15 and not over 100 gross tons | |
| Vessels of over 100 and not over 300 gross tons | |
| Vessels of over 300 gross tons | |

Freight and towing vessels of over 15 gross tons constructed o wood or hull constructed of metal with wood superstructure shall b provided with chemical fire extinguishers as hereinafter described viz:

| | Minimum number fire extinguishers. |
|---|---|
| Vessels of over 15 and not over 75 gross tons | |
| Vessels of over 75 and not over 200 gross tons | |
| Vessels of over 200 and not over 500 gross tons | |
| Vessels of over 500 gross tons | |

The above tables of required fire extinguishers are based on th capacity of the ordinary machine, which is about 2½ gallons, and n fire extinguisher of larger capacity shall be allowed a greater ratin than that of the ordinary machine. Fire extinguishers of approve types of less capacity are allowable under the above tables when thei total contents equal the required quantity.

All vessels carrying passengers which transport automobiles o motor vehicles the motive power of which is generated by any of th products of petroleum or other inflammable liquids shall carry, i addition to the chemical fire extinguishers required by the precedin table for vessels carrying passengers, an approved carbon tetrachlorid or foam-type fire extinguisher which has demonstrated a capacity fo extinguishing burning oils, burning gasoline, and other burning prod ucts of petroleum, in accordance with the following table:

| Automobiles or motor vehicles carried: | Carbon tetrachloride or foam-typ fire extinguishers required. |
|---|---|
| 1 and not over 3 | |
| 4 and not over 7 | |
| 8 and not over 12 | |
| 13 and not over 20 | |
| 21 and not over 30 | |
| 31 and not over 40 | |
| 41 and not over 50 | |
| 51 and over, to be added to 11, for each 10 or less additional automobiles or motor vehicles | |

When a vessel is provided with enough fire extinguishers to tak care of all the automobiles or motor vehicles that can be carried, n

extra fire extinguishers shall be required for any number of motor cycles carried.

Extra charges shall be carried on board for 50 per cent of each class of fire extinguishers provided. If 50 per cent of each class of fire extinguishers carried gives a fractional result, extra charges shall be provided for the next largest whole number.

*Example.*

| Fire extinguishers carried. | Extra charges required. |
|---|---|
| 1 | 1 |
| 2 | 1 |
| 3 | 2 |
| 4 | 2 |
| 5 | 3 |

Fire extinguishers shall be located in such parts of the vessels as in the judgment of the local inspectors will be most convenient and serviceable in case of emergency, and so arranged that they may be easily removed from their fastenings. Every fire extinguisher thus provided for shall be discharged and examined at each annual inspection.

Every fire extinguisher provided for and required by this section shall be tested by the Bureau of Standards, Department of Commerce, and a report made by that bureau to the Board of Supervising Inspectors, which shall then determine whether the said extinguisher shall be approved for use on vessels subject to inspection.

Every fire extinguisher approved after May 31, 1921, for use on vessels under the jurisdiction of the Steamboat Inspection Service shall have affixed thereto a metallic name plate having plainly stamped thereon the name of the fire extinguisher, the rated capacity in gallons or quarts, and the name and place of person or firm for whom approved. (Sec. 4479, R. S.)

See page 183 for list of approved fire extinguishers.

### AUTOMATIC FIRE-ALARM SYSTEM.

14. All passenger vessels of more than 150 feet in length, whose construction is contracted for after June 30, 1916, which are provided with staterooms or other sleeping quarters for passengers, shall be equipped with an efficient fire-alarm system or indicator which will automatically indicate or register, at one or more points or stations where it can be most quickly observed by the officers or crew of the vessel, the presence or indication of fire in the staterooms and various other compartments of the vessel which are not accessible to the observation of the officers or crew: *Provided, however,* That cargo compartments need not be provided with an automatic registering or indicating fire-alarm system, if such cargo compartments are provided with other approved means for the officers and crew to discover the presence or indication of fire. (Sec. 4472, R. S.)

## RULE V.—LICENSED OFFICERS.

### ORIGINAL LICENSES.

1. Before an original license is issued to any person to act as a master, mate, pilot, or engineer he shall personally appear before some local board or a supervising inspector for examination. Any

person who has attained the age of 19 years and has had the necessary experience shall be eligible for examination: *Provided*, That no person shall receive a license as master, first mate, second mate, chief engineer, first assistant engineer, or second assistant engineer before reaching the age of 21 years.

Inspectors shall, before granting an original license to any person to act as an officer of a vessel, require the applicant to make written application upon the blank form furnished by the Department of Commerce, to be filed in the inspector's office. When practicable, applicants for master's, mate's, pilot's, or engineer's license shall present to the inspectors, to be filed with their application, discharges or letters from the master or other officer under whom they have served, certifying to the name of the vessel and in what capacity the applicant has served under him; also period of such service. Inspectors shall also, when practicable, require applicant for pilot's license to have the written indorsement of the master and engineer of the vessel upon which he has served, and of one licensed pilot, as to his qualifications. In the case of applicants for original engineer's license, they shall also, when practicable, have the indorsement of the master and engineer of a vessel on which they have served, together with one other licensed engineer.

The first license issued to any person by a United States inspector shall be considered an original license, where the United States records show no previous issue to such applicant.

No original license shall be issued to any naturalized citizen on less experience in any grade than would have been required of a citizen of the United States by birth.

On and after July 1, 1922, no candidate for original license as master, mate, pilot, or engineer shall be examined unless he shall present satisfactory evidence to the inspectors that he has completed a course of instructions in the principles of first aid approved by the United States Public Health Service for this particular purpose, and not until he presents a certificate from the United States Public Health Service, duly attested, that he has passed a satisfactory oral examination based upon the contents of the "Manual on Ship Sanitation and First Aid" or some other manual arranged for the purpose having the approval of the United States Public Health Service. (Sec. 4405, R. S.)

### VISUAL EXAMINATIONS REQUIRED FOR ORIGINAL AND RENEWED LICENSES.

2. No original license as master, mate, or pilot of any vessel shall be issued except upon the official certificate of a surgeon of the Public Health Service respecting the vision of the person applying for such original license. The word "original" as contemplated in this section shall mean the first license of any character issued to a master, mate, or pilot, and shall not be held to mean, for instance, that a license issued to a master who was previously licensed as a mate or pilot shall be considered an original master's license.

No license as master, mate, or pilot of any class of vessel shall be renewed except upon the official certificate of a surgeon of the Public Health Service that the color sense of the applicant for renewal is normal.

Where an applicant for renewal of license is situated so that it would put him to great inconvenience or expense to appear before a surgeon of the Public Health Service for examination, the certificate of a reputable physician or oculist as to the color sense of the applicant shall be accepted in lieu of the certificate of the surgeon of the Public Health Service.

In case an applicant for original license or renewal of license is pronounced color-blind he may, in the discretion of the inspectors, be limited to act as master, mate, or pilot on a vessel navigating in daylight only.

Nothing herein contained shall debar an applicant who has lost the sight of one eye from securing a renewal of his license, providing that his color sense is normal. (Secs. 4439, 4440, 4442, R. S.)

EXAMINATIONS.

3. Before an applicant for an original master's, mate's, pilot's, or engineer's license, or a raise of grade, or an extension of route, may be examined, the applicant shall, if practicable, present to the inspectors discharges or letters certifying to the amount and kind of his experience. If the amount and kind of his experience is satisfactory, the applicant shall be examined, in writing, as to his knowledge, by a board of local inspectors or a supervising inspector, which written examination, together with the proofs of his experience, shall be placed on file in the office of the inspectors issuing the license: *Provided, however,* That upon navigable waters of the United States newly opened to steamboat navigation, and where the only pilots obtainable are illiterate Indians or other natives, the fact that such persons can neither read nor write shall not be considered a bar to such Indians or other natives receiving license as pilot of steam vessels, provided they are otherwise qualified therefor.

Before granting or renewing a license inspectors shall satisfy themselves that the applicants can properly hear the bell and whistle signals.

When any person makes application for license it shall be the duty of the local inspectors to give the applicant the required examination as soon as practicable. (Secs. 4405, 4439, 4440, 4441, 4442, R. S.)

REEXAMINATIONS AND REFUSAL OF LICENSES.

4. Any applicant for license who has been duly examined and refused may come before the same local board for reexamination at any time thereafter that may be fixed by such board, but he shall not be examined by any other local board until one year has expired from the date of the refusal without the sanction of the board that refused the applicant.

If the inspectors shall decline to grant the applicant the license asked for, they shall furnish him a statement, in writing, setting forth the cause of their refusal to grant the same. (Secs. 4405, 4455, R. S.)

PREPARATION OF LICENSES.

5. All licenses hereafter issued to masters, mates, pilots, and engineers shall be filled out on the face with pen and black ink instead of typewritten. Inspectors are directed, when licenses are completed,

to draw a broad pen and black-ink mark through all unused spaces in the body thereof, so as to prevent, as far as possible, illegal interpolation after issue.

Every person receiving license or certificate of lost license shall sign same upon back thereof immediately upon its receipt. (Sec. 4405, R. S.)

CERTIFICATE OF LOST LICENSE.

6. In case of loss of license of any class from any cause any board of local inspectors upon receiving satisfactory evidence of such loss and a record of the lost license from the board that issued same shall issue a certificate to the owner thereof, which shall have the authority of the lost license for the unexpired term, unless in the meantime the holder thereof shall have the grade of his license raised, after due examination, in which case a license in due form for such grade may be issued. In all cases where a certificate of lost license is issued by a board other than the board that issued the lost license the certificate of lost license shall state what board issued the lost license.

Whenever a license is reported to a board of local inspectors by a licensed officer as having been stolen from him, or whenever a license is stolen from an office of local inspectors, the local inspectors shall immediately report the fact in either case to the Supervising Inspector General and give a full description of the license. (Sec. 4405, R. S.)

PARTING WITH LICENSE.

7. Any license granted to a master, mate, pilot, engineer, or operator shall be immediately revoked if, for any purpose, the holder thereof voluntarily parts with its possession or places it beyond his personal control by pledging or depositing it with another. (Sec. 4405, R. S.)

RENEWAL OF LICENSE.

8. Whenever an officer shall apply for a renewal of his license for the same grade, the presentation of the old license, with satisfactory certificate of visual examination, where required, and with oath of office, shall be considered sufficient evidence of his title to renewal, which old license and oath of office shall be retained by the inspectors upon their official files as the evidence upon which the license was renewed: *Provided*, That it is presented within 12 months after the date of its expiration, unless such title has been forfeited or facts shall have come to the knowledge of the inspectors which would render a renewal improper; nor shall any license be renewed more than 30 days in advance of the date of the expiration thereof, unless there are extraordinary circumstances that shall justify a renewal beforehand, in which case the reasons therefor must appear in detail upon the records of the inspectors renewing the license.

Whenever an officer shall apply for renewal of his license for same grade, after 12 months after the date of its expiration, he shall be required to pass an examination for the same grade of license. The renewed license in either case shall receive the next higher number for number of issue of present grade and for number of issues of all grades.

Whenever a licensed officer makes application for a renewal of his cense, he shall appear in person before some board of local inpectors or supervising inspector, except that upon renewal of such cense for the same grade, when the distance from any local board r supervising inspector is such as to put the person holding the ame to great inconvenience and expense to appear in person, he ay, upon taking oath of office before any person authorized to adinister oaths, and forwarding the same, together with the license be renewed and certificate of visual examination where required, the local board or supervising inspector of the district in which e resides or is employed, have the same renewed by the said inpectors, if no valid reason to the contrary be known to them; and ey shall attach such oath to the stub end of the license, which is be retained on file in their office: *Provided, however,* That any fficer holding a license, and who is engaged in a service which necesitates his continuous absence from the United States, may make pplication in writing for renewal and transmit the same to the oard of local inspectors, with his certificate of citizenship, if natualized, and a statement of the applicant, verified before a consul or ther officer of the United States authorized to administer an oath, etting forth the reasons for not appearing in person; and upon reeiving the same the board of local inspectors that originally issued uch license shall renew the same and shall notify the applicant of uch renewal, and no license as master, mate, or pilot of any class f vessel shall be renewed without furnishing a satisfactory certifiate of color blindness. (Secs. 4405, 4438, R. S.)

EXTENSION OF ROUTE AND RAISE OF GRADE OF LICENSES.

9. Licensed officers serving under five years' license, entitled by cense and service to raise of grade, after passing examination, shall ave issued to them new licenses for the grade for which they are ualified, the local inspectors to file in their office the old license when urrendered, with the report of the circumstances of the case, but the rade of no license shall be raised except as hereinafter provided, nless the applicant can show one year's actual experience in the apacity for which he has been licensed.

Inspectors shall, before granting an extension of route or raise of rade of license, require the applicant to make his written applicaion upon the blank form of application for extension of route or aise of grade of license furnished by the Department. When practicable, applicants for extension of route or raise of grade of license hall present to the inspectors, to be filed with the application, disharges or letters from the master or other officer under whom they ave served, or other satisfactory documentary evidence, certifying the name of the vessel and in what capacity the applicant has erved; also period of such service.

If any board of local inspectors is satisfied by the documentary vidence submitted that a pilot is entitled by experience and knowlge to unlimited tonnage, it may remove any tonnage restrictions hich may have been placed upon his license by any other board of ocal inspectors.

Except as hereinafter provided, practical service in the deck deartment of an ocean or coastwise vessel propelled by machinery

shall be accepted when offered in documentary evidence by any pe son applying for an original license or raise of grade as equal to th same amount of service in any ocean or coastwise steam passeng vessel.

Service on United States lighthouse tenders propelled by machin ery shall be considered as equivalent experience for raise of grade a that obtained on vessels subject to inspection by this Service.

Service on United States light vessels propelled by machinery sha be considered as one-half experience for raise of grade as that ob tained on vessels subject to inspection by this Service. (Sec. 4405 R. S.)

EXAMINATION FOR RENEWAL OF MASTER'S OR PILOT'S LICENSE.

10. It shall be the duty of all inspectors, before renewing an exist ing license to a master or pilot of steam vessels, for any waters, wh has not been employed as master or pilot on such waters during th three years preceding the application for renewal, to satisfy them selves, by an examination in writing, or orally, to be taken down i writing by the inspectors, that such officers are thoroughly familia with the pilot rules upon the waters for which they are licensed (Secs. 4439, 4442, R. S.)

LAWS, GENERAL RULES AND REGULATIONS, AND PILOT RULES TO B FURNISHED LICENSED OFFICERS.

11. Every master, mate, pilot, and engineer of vessels shall, whe receiving an original license, a renewed license, or a raise of grade o license, be furnished by the inspectors with a copy of the Law Governing the Steamboat Inspection Service, and a copy of th General Rules and Regulations Prescribed by the Board of Super vising Inspectors, and every master and pilot of vessels and operato of motor vessels shall, when receiving an original license, a renewe license, or a raise of grade of license, be furnished by the inspector with a pamphlet copy of the rules and regulations governing pilot and of the statutes upon which such rules are founded, applicable t the waters on which their licenses are intended to be used, as state in the body thereof. (Sec. 4405, R. S.)

SUSPENSION AND REVOCATION OF LICENSES.

12. When the license of any master, mate, pilot, or engineer i revoked such license expires with such revocation, and any licens subsequently granted to such person shall be considered in the ligh of an original license except as to number of issue. And upon th revocation or suspension of the license of any such officer said licens shall be surrendered to the local inspectors or supervising inspecto ordering such suspension or revocation.

When the license of any master, mate, engineer, or pilot is sus pended the inspectors making such suspension shall determine th term of its duration, except that such suspension shall not exten beyond the time for which the license was issued.

The suspension or revocation of a joint license shall debar th person holding the same from the exercise of any of the privilege therein granted, so long as such suspension or revocation shall remai in force. (Sec. 4450, R. S.)

MISCONDUCT OF LICENSED OFFICERS.

13. Whenever a supervising, local, or assistant inspector of steam vessels, or any of them, shall find on board any vessel subject to the provisions of Title LII of the Revised Statutes any licensed officer under the influence of liquor or other stimulant to such an extent as to unfit him for duty, or when any licensed officer shall use abusive or insulting language to any inspector or assaults any such inspector while on official duty, the local inspectors or the supervising inspector shall immediately suspend or revoke the license of the officer so offending without further trial or investigation.

The fact of a licensed officer being under the influence of liquor in the presence of the inspector or inspectors to such an extent as to unfit him for duty while on board a vessel shall be sufficient cause for such suspension or revocation. (Secs. 4405, 4450, R. S.)

LICENSES TO OFFICERS OF VESSELS OWNED BY THE UNITED STATES.

14. Any person who has served at least one year as master, commander, pilot, or engineer of any steam vessel owned and operated by the United States in any service in which a license as master, mate, pilot, or engineer was not required at the time of such service shall be entitled to license as master, mate, pilot, or engineer, if the inspectors, upon written examination, as required for applicants for original license, may find him qualified: *Provided*, That the experience of any such applicant within three years of making application has been such as to qualify him to serve in the capacity for which he makes application to be licensed. (Secs. 4439, 4440, 4441, 4442, R. S.)

REPORTS OF ACCIDENTS TO VESSELS.

15. The licensed officer in command of any vessel shall report in writing and in person to the board of local inspectors nearest the port of first arrival any accident to said vessel involving loss of life or damage to property to an approximate amount exceeding $100, and shall also report in the same manner any casualty or loss of life from whatever cause of any person on board such vessel and any stranding or grounding, whether or not any damage has been sustained by the vessel. If the accident happens upon the high seas or without the jurisdiction of inland waters, the board to whom the report is first made shall make the investigation; but if the accident occurs within the jurisdiction of inland waters, the report shall be transmitted to the board within whose jurisdiction the accident occurred, which board shall make the investigation, except in cases where, in the judgment of the Supervising Inspector General, better results may be obtained by another board conducting the investigation, in which case the Supervising Inspector General is authorized to direct such investigation by another board: *Provided*, That when from distance it may be inconvenient to report in person it may be done in writing only, and the report sworn to before any person authorized to administer oaths.

Whenever a vessel commanded by an officer licensed by the Steamboat Inspection Service collides with a lightship, buoy, or other aid to navigation under the jurisdiction of the Bureau of Lighthouses, or is connected with any such collision, it shall be the duty of the

licensed officer in command of such vessel to report the accident the nearest board of local inspectors. When any collision of th character is reported to a board of local inspectors, those office shall immediately transmit such information to the superintende of lighthouses of the district in which the collision occurred.

Failure to promptly render the reports required by this sectic shall be deemed sufficient cause for suspension or revocation of licens

Whenever in an investigation of an accident to a vessel, made b a board of local inspectors, it is stated by the officers of the vess concerned, or it is developed by the investigation, or it is stated in report of an accident, that the accident was due to a collision with light vessel, buoy, or other aid to navigation under the jurisdictio of the Lighthouse Service, or to any fault of any such aid, or to the lac of such aid, the local inspectors investigating the case, or to whor the report was made, shall promptly report to the Commissioner c Lighthouses, through the supervising inspector of the district an the Supervising Inspector General, on the form provided for th purpose, the location of the accident; the aid to navigation near o at which the accident occurred; the nature of the accident; th alleged cause of the accident; whether or not the accident was du to some alleged fault of the aid, either in its operation or location the proposed improvement in the aid, if such has been suggested and all other information or suggestions coming to them which woul be of value to the Lighthouse Service. If an investigation was held the findings of the board shall also be reported. Local inspector shall also report in the same manner any other information o suggestions coming to them concerning the need of additional aid to navigation or the modification of any existing aids.

Boards of local inspectors are authorized to call on the superintendent of lighthouses of the district for any information concernin aids to navigation that will be useful in an investigation of an accident. (Secs. 4405, 4448, R. S.)

### ONLY CERTAIN PERSONS ALLOWED IN PILOT HOUSE AND ON NAVIGATOR'S BRIDGE.

16. Masters and pilots of steamers carrying passengers shall exclude from the pilot houses and navigator's bridge of such steamers, while under way, all persons not connected with the navigation of such steamers, except officers of the Steamboat-Inspection Service, Coast Guard, and engineer officers of the United States Army in charge of the improvement of that particular waterway, when upon business: *Provided*, That licensed officers of steamboats, persons regularly engaged in learning the profession of pilot, officers of the United States Navy, United States Coast and Geodetic Survey, and Lighthouse Service, assistant engineers of the Engineer Department of the United States Army connected with the improvement of that particular waterway, and the engineer officers connected with the construction and operation of the Panama Canal may be allowed in the pilot house or upon the navigator's bridge upon the responsibility of the officer in charge.

The master of every such passenger and ferry steamer shall keep three printed copies of this section of Rule V posted in conspicuous places on such steamer, one of which shall be kept posted in the pilot house.

Such printed copies shall be furnished by the Department of Commerce to local inspectors for distribution. (Sec. 4405, R. S.)

STATION BILLS, DRILLS, AND REPORTS OF MASTERS.

17. It shall be the duty of the officer in charge of every steamer carrying passengers and all other vessels of over 500 gross tons, propelled by machinery and subject to inspection, to cause to be prepared a station bill for his own department, and one also for the engineer's department, in which shall be assigned a post or station of duty for every person employed on board such vessel in case of fire or other disaster, which station bills shall be placed in the most conspicuous places on board for the observation of the crew. And it shall be the duty of such master, or of the mate or officer next in command, once at least in each week, to call all hands to quarters and exercise them in discipline, and in the unlashing and swinging out of the lifeboats, weather permitting, and in the use of the fire pumps, and all other apparatus for the safety of life on board of such vessel, with especial regard for the drill of the crew in the method of adjusting life preservers and educating passengers and others in this procedure and to see that all the equipments required by law are in complete working order for immediate use; and the fact of the exercise of the crew, as herein contemplated, shall be entered upon the vessel's log book, stating the day of the month and hour when so exercised; and it shall be the duty of the inspectors to require the officers and crew of all such vessels to perform the aforesaid drills and discipline in the presence of the said inspectors at intervals sufficiently frequent to assure the said inspectors by actual observation that the foregoing requirements of this section are complied with; the master of every passenger steamer shall also report monthly to the local inspectors the day and date of such exercise and drill, the condition of the vessel and her equipment, and also the number of passengers carried, and any neglect or omission on the part of the officer in command of such vessel to strictly enforce this rule shall be deemed cause for the suspension or revocation of the license of such officer.

The *general* fire-alarm signal shall be a continuous rapid ringing of the ship's bell for a period of not less than 20 seconds, and this signal shall not be used for any other purpose whatsoever. The master of any vessel may establish such other emergency signals, in addition to the ringing of the ship's bell, as will provide that all the officers and all the crew of the vessel will have positive and certain notice of the existing emergency.

Three copies of this section shall be furnished every steamer carrying passengers, and one copy to all other vessels to which this section applies, to be framed under glass and posted in conspicuous places about the vessel. (Sec. 4405, R. S.)

VESSELS REQUIRING LICENSED MASTERS.

18. There shall be a duly licensed master on board every steam vessel of more than 150 gross tons whenever such steamer is under way, and also upon every ocean and coastwise seagoing merchant vessel of the United States propelled by machinery, and upon every ocean-going vessel carrying passengers, subject to the inspection laws of the United States. (Secs. 4439, 4463, R. S.)

SUBSTITUTING SERVICE IN NEXT LOWER GRADE FOR RAISE OF GRADE

19. Except as hereinafter provided, an applicant who has served in a lower grade than that for which he is licensed may substitute service in the grade next below that for which he is licensed, which service shall count one-half in computing experience for raise of grade. For example, if an applicant holds chief mate's license and has served nine months as chief mate and six months as second mate, the six months' service as second mate shall count as three months as chief mate in computing experience. (Sec. 4405, R. S.)

MASTER OF OCEAN STEAM VESSELS.

20. An applicant for license as master of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as chief mate of ocean steam vessels, or

Second. One year's service as chief mate of coastwise steam vessels of 1,000 gross tons or over, or,

Third. Two years' service as second mate of ocean steam vessels while holding a license as chief mate of ocean steam vessels, or,

Fourth. Five years' service as third mate of ocean steam vessels two years of such service while holding a license as chief mate of ocean steam vessels, or,

Fifth. Five years' service on ocean or coastwise sail vessels of 200 gross tons or over, two years of said service as master of such sail vessels while holding a license as master of sail vessels, for license as master of freight or towing vessels, or,

Sixth. Six months' service as master of coastwise steam vessels of 1,000 gross tons or over, or,

Seventh. Thirty-six months' service as master of steam vessels of 4,000 gross tons or over upon the waters of the Great Lakes, together with 12 months' service as chief or second mate of ocean or coastwise steam vessels. (Sec. 4439, R. S.)

EXAMINATION FOR MASTER OF OCEAN STEAM VESSELS.

21. An applicant for license as master of ocean steam vessels shall pass a satisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude of the sun.
2. Latitude by exmeridian altitude of the sun.
3. Latitude by meridian altitude of a star.
4. Latitude by pole star.
5. Longitude by chronometer (a. m. or p. m.).
6. Position by Sumner's method.
7. Ship's position by dead reckoning.
8. Mercator's sailing.
9. Deviation of the compass by an amplitude.
10. Deviation of the compass by an azimuth.
11. Time of high water at a given port.
12. Chart navigation.
13. Storm signals.
14. International code of signals.
15 International rules for preventing collisions at sea.

16. Use of gun and rocket apparatus for saving life from shipwreck, as practiced by the United States Coast Guard.

17. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4439, R. S.)

MASTER OF COASTWISE STEAM VESSELS.

22. An applicant for license as master of coastwise steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as chief mate of ocean or coastwise steam vessels, or,

Second. Two years' service as second mate of ocean or coastwise steam vessels while holding a license as chief mate of ocean or coastwise steam vessels, or,

Third. Five years' service as third mate of ocean or coastwise steam vessels, two years of such service while holding a license as chief mate of ocean or coastwise steam vessels, or,

Fourth. Two years' service as master of lake, bay, or sound steam vessels of 500 gross tons or over, and, in addition thereto, one year's service as officer in charge of a watch on ocean or coastwise steam vessels while holding a license as master of lake, bay, or sound steam vessels, or,

Fifth. Five years' service on ocean or coastwise sail vessels of 200 gross tons or over, two years of which service shall have been as master of such sail vessels for license as master of coastwise freight or towing vessels, or,

Sixth. One year's service as a licensed master of ocean or coastwise sail vessels of 700 gross tons or over for a license as master of coastwise freight or towing vessels, or,

Seventh. Two years' service as master or first-class pilot of lake, bay, or sound towing steamers of 150 gross tons or over, for license as master of coastwise towing steam vessels of 750 gross tons or under, or,

Eighth. Two years' service as master of steam vessels of 1,000 gross tons or over, except ferry vessels, on the Great Lakes and other lakes, bays, or sounds, for license as master of coastwise vessels on routes not exceeding 300 miles, or,

Ninth. Two years' service as a licensed master of steam vessels of 250 gross tons or over engaged in the ocean or coastwise fisheries, for license as master of coastwise freight or towing vessels. (Sec. 4439, R. S.)

EXAMINATION FOR MASTER OF COASTWISE STEAM VESSELS.

23. An applicant for license as master of coastwise steam vessels on routes exceeding 300 miles shall pass a satisfactory examination as to his knowledge of the following subjects:

1. Longitude by chronometer.
2. Latitude by meridian altitude of the sun.
3. Latitude by pole star.
4. Ship's position by dead reckoning.
5. Azimuth of sun by tables.
6. Determination of distance from a fixed object.

7. Chart navigation.
8. International rules for preventing collisions at sea.
9. Storm signals.
10. Use of gun and rocket apparatus for saving life from shipwreck, as practiced by the United States Coast Guard.
11. Such further examination of a nonmathematical character as the local inspectors may require.

An applicant for license as master of coastwise steam vessels on routes not exceeding 300 miles shall pass a satisfactory examination as to his knowledge of the following subjects:

1. Chart navigation.
2. Aids to navigation on route.
3. Determination of distance from a fixed object.
4. International rules for preventing collisions at sea.
5. Storm signals.
6. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4439, R. S.)

### MASTERS OF SAIL VESSELS.

24. An applicant for license as master of sail vessels of over 700 gross tons shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. Five years' service in the deck department of sail vessels of 200 gross tons or over; one year of such service shall have been as master of sail vessels of 500 gross tons or over, or,

Second. Two years' service as master of sail vessels of 200 gross tons or over, or,

Third. Two years' service as mate of sail vessels of 500 gross tons or over, or,

Fourth. Two years' service as master of auxiliary sail vessels of 100 gross tons or over. (Sec. 4439, R. S.)

### EXAMINATION FOR LICENSE AS MASTER OF SAIL VESSELS.

25. An applicant for license as master of sail vessels shall pass a satisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude of the sun.
2. Latitude by pole star.
3. Longitude by chronometer (a. m. or p. m.).
4. Ship's position by dead reckoning.
5. Mercator's sailing.
6. Deviation of the compass by an amplitude.
7. Deviation of the compass by an azimuth.
8. Chart navigation.
9. International code of signals.
10. Storm signals.
11. International rules for preventing collisions at sea.
12. Use of gun and rocket apparatus for saving life from shipwreck, as practiced by the United States Coast Guard.
13. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4439, R. S.)

### CHIEF MATE OF OCEAN STEAM VESSELS.

26. Any applicant for license as chief mate of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as second mate of ocean steam vessels, or,

Second. One year's service as second mate as coastwise steam vessels of 1,000 gross tons or over, or,

Third. Two years' service as officer in charge of a watch on ocean or coastwise steam vessels, while holding a license as second mate of ocean or coastwise steam vessels, or,

Fourth. Two years' service as master of lake, bay, or sound steam vessels of 1,000 gross tons or over, together with six months' service as officer in charge of a watch on ocean or coastwise steam vessels of 1,000 gross tons or over, or,

Fifth. Five years' service in the deck department of ocean or coastwise sail vessels of 200 gross tons or over; two years of such service shall have been as chief mate of such ocean or coastwise sail vessels, for license as chief mate of ocean freight or towing steam vessels, or,

Sixth. One year's service as a licensed master of steam vessels of 250 gross tons or over engaged in the ocean or coastwise fisheries, for license as chief mate of ocean freight or towing steam vessels, or,

Seventh. Five years' experience in the deck department of any ocean or coastwise sail vessels of 100 gross tons or over; two years of such service shall have been as master of such vessels for license as chief mate of ocean freight or towing steam vessels. (Sec. 4440, R. S.)

### SECOND MATE OF OCEAN STEAM VESSELS.

27. Any applicant for license as second mate of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as third mate of ocean or coastwise steam vessels, or,

Second. Four years' service in the deck department of ocean or coastwise steam vessels, two years of which shall have been as boatswain or quartermaster, or,

Third. A graduate who has served two years in the seamanship class of a State nautical schoolship and completed two ocean or coastwise cruises before graduation, together with six months' service in the deck department of ocean or coastwise steam or sail vessels of 200 gross tons or over: *Provided*, That where the graduate has completed the two cruises, but not the two years' service required, additional service equal to the difference in time, shall be served on vessels of the class required for the probationary period of six months, or,

Fourth. Three years' service in the deck department of ocean or coastwise sail vessels of 200 gross tons or over; one year of such service shall have been as second mate of such vessels, or,

Fifth. Two years' service in the deck department of any ocean or coastwise sail vessel of 100 gross tons or over, together with one year's service in the deck department of ocean or coastwise steam vessels,

for license as second mate of ocean or coastwise steam vessels of 75 gross tons or under, or,

Sixth. One year's service as master or first class pilot of lake, bay or sound steam vessels of 500 gross tons or over, together with six months' service in the deck department of ocean or coastwise steam vessels of 1,000 gross tons or over, while holding a license as master or first class pilot.

Seventh. Two years' service as assistant (junior officer of the watch) to the officer on watch while holding a license as third mate ocean. (Sec. 4440, R. S.)

EXAMINATION FOR LICENSE AS CHIEF MATE AND SECOND MATE OF OCEAN STEAM VESSELS.

28. An applicant for license as chief mate or second mate of ocean steam vessels shall be required to pass a satisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude of the sun.
2. Latitude by meridian altitude of a star.
3. Longitude by chronometer (a. m. or p. m.).
4. Speed of a ship by propeller revolutions (Note: For chief mate only).
5. Deviation of the compass by an azimuth.
6. Ship's position by dead reckoning.
7. Mercator's sailing.
8. Determination of distance from a fixed object.
9. Chart navigation.
10. Storm signals.
11. International code of signals.
12. International rules for preventing collisions at sea.
13. Stowage of cargo.
14. Use of gun and rocket apparatus for saving life from shipwreck, as practiced by the United States Coast Guard.
15. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4440, R. S.)

THIRD MATE OF OCEAN STEAM VESSELS.

29. Any applicant for license as third mate of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. Two years' service in the deck department of ocean or coastwise steam vessels.

Second. A graduate who has served two years in the seamanship class of a nautical schoolship and completed two ocean or coastwise cruises before graduation: *Provided*, That where the graduate has completed the two cruises, but not the two years' service required, additional service equal to the difference in time shall be served on vessels of the class required for the probationary period of two years, or,

Third. Three years' service in the deck department of ocean or coastwise sail vessels of 100 gross tons or over. Service on such sail vessels engaged in the ocean or coastwise fisheries shall be accepted as meeting the requirements of this paragraph, or,

Fourth. One year's service as master or pilot of lake, bay, or sound steam vessels of 150 gross tons or over, together with six months' service in the deck department of ocean or coastwise steam vessels, or,

Fifth. Three years' service in the deck department of ocean or coastwise steam or sail vessels of less than 100 gross tons, together with one year's service in the deck department of ocean or coastwise steam vessels, or,

Sixth. Three years' service in the deck department of lake, bay, or sound steam vessels, together with one year's service in the deck department of ocean or coastwise steam vessels, or,

Seventh. Twenty-four months' service as a licensed first-class pilot of steam vessels of 4,000 gross tons or over on the Great Lakes and other lakes, bays, or sounds, or,

Eighth. Three years' service in the deck department of steam vessels of 100 gross tons or over engaged in the ocean or coastwise fisheries. (Sec. 4440, R. S.)

EXAMINATION FOR LICENSE AS THIRD MATE OF OCEAN STEAM VESSELS.

30. An applicant for license as third mate of ocean steam vessels shall be required to pass a satisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude of the sun.
2. Deviation of the compass by an azimuth of the sun.
3. Longitude by chronometer (a. m. or p. m.).
4. Ship's position by dead reckoning.
5. Mercator's sailing.
6. Determination of distance from a fixed object.
7. Chart navigation.
8. International rules for preventing collisions at sea.
9. Stowage of cargo.
10. Storm signals.
11. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4440, R. S.)

CHIEF MATE OF COASTWISE STEAM VESSELS.

31. An applicant for license as chief mate of coastwise steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as second mate of ocean or coastwise steam vessels, or,

Second. Two years' service as officer in charge of a watch on ocean or coastwise steam vessels while holding a license as second mate of ocean or coastwise steam vessels, or,

Third. One year's service as master or first-class pilot of lake, bay, or sound steam vessels of 150 gross tons or over, together with one year's service as quartermaster or wheelsman on ocean or coastwise steam vessels while holding a license as such master or first-class pilot, or,

Fourth. Two years' service as master or first-class pilot of lake, bay, or sound towing vessels for license as chief mate of coastwise towing vessels of 750 gross tons or under, or,

Fifth. Three years' service in the deck department of ocean or coastwise steam vessels for license as chief mate of coastwise steam vessels of 750 gross tons or under, or,

Sixth. One year's service as a licensed master or two years' service as a licensed mate on ocean or coastwise steam vessels of 250 gross

tons or over engaged in the ocean or coastwise fisheries for licens as chief mate of freight or towing steamers, or,

Seventh. Five years' service in the deck department of any ocea or coastwise sail vessel of 100 gross tons or over, two years of suc service shall have been as master of such vessel, for license as chi mate of freight or towing steam vessels, or,

Eighth. Two years' service in the deck department of ocean c coastwise sail vessels, together with one year's service in the dec department of ocean or coastwise steam vessels, for license as chi mate of coastwise steam vessels of 750 gross tons or under.

Ninth. Two years' service as first-class pilot, or two years' com bined service as master and first-class pilot of steam vessels of 1,00 gross tons or over, except ferry vessels, on the Great Lakes and othe lakes, bays, and sounds, for license as chief mate of coastwise vessel on routes not exceeding 300 miles. (Sec. 4440, R. S.)

### SECOND MATE OF COASTWISE STEAM VESSELS.

32. An applicant for license as second mate of coastwise steam ves sels shall be eligible for examination after he has furnished satis factory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as third mate of ocean or coastwise steam vessels; or,

Second. Four years' service in the deck department of ocean or coastwise steam vessels, two years' of which shall have been as boatswain or quartermaster, or,

Third. Two years' service in the deck department of any ocean or coastwise sail vessels of 100 gross tons or over, together with one year's service in the deck department of ocean or coastwise steam vessels, for a license as second mate of coastwise steam vessels of 750 gross tons or under, or,

Fourth. A graduate who has served two years in the seamanship class of a State nautical schoolship and completed two ocean or coast-wise cruises before graduation, together with six months' service in the deck department of ocean or coastwise steam or sail vessels: *Provided*, That where the graduate has completed the two cruises, but not the two years' service, required, additional service equal to the difference in time shall be served on ocean or coastwise steam or sail vessels, or,

Fifth. One year's service as a licensed master or first-class pilot of lake, bay, or sound steam vessels of 150 gross tons or over, to-gether with six months' service in the deck department of ocean or coastwise steam vessels, or,

Sixth. One year's service as a licensed mate on ocean or coastwise steam vessels of 150 gross tons or over engaged in the fisheries.

Seventh. Two years' service as assistant (junior officer of the watch) to the officer on watch while holding a license as third mate, coastwise.

Eighth. Two years' service as first or second class pilot of steam vessels of 1,000 gross tons or over, except ferry vessels, on the Great Lakes and other lakes, bays, and sounds, for license as second mate of coastwise vessels on routes not exceeding 300 miles. (Sec. 4440, R. S.)

XAMINATION FOR LICENSE AS CHIEF MATE AND SECOND MATE OF COASTWISE STEAM VESSELS.

33. An applicant for license as chief mate or second mate of coastise steam vessels on routes exceeding 600 miles shall be required to ass a satisfactory examination as to his knowledge of the following ıbjects:

1. Latitude by meridian altitude of the sun.
2. Ship's position by dead reckoning.
3. Determination of distance from a fixed object.
4. International rules for preventing collisions at sea.
5. Chart navigation.
6. Stowage of cargo.
7. Storm signals.
8. Such further examination of a nonmathematical character as ıe local inspectors may require.

An applicant for license as chief mate or second mate of coastise steam vessels on routes of 600 miles or less shall be required to ass a satisfactory examination as to his knowledge of the following ıbjects:

1. Chart navigation.
2. Aids to navigation on route.
3. Determination of distance from a fixed object.
4. Marking of lead line.
5. International rules for preventing collisions at sea.
6. Storm signals.
7. Stowage of cargo.
8. Such further examination of a nonmathematical character as ıe local inspectors may require. (Sec. 4440, R. S.)

THIRD MATE OF COASTWISE STEAM VESSELS.

34. An applicant for license as third mate of coastwise steam essels shall be eligible for examination after he has furnished satfactory documentary evidence to the local inspectors that he has ad the following experience:

First. Two years' service in the deck department of ocean or coastise steam vessels.

Second. A graduate who has served two years in the seamanship ass of a nautical schoolship and completed two ocean or coastwise uises before graduation: *Provided*, That where the graduate has ompleted the two cruises, but not the two years' service required, ldditional service equal to the difference in time shall be served on essels of the class required for the probationary period of two ears, or,

Third. Three years' service in the deck department of ocean or astwise sail vessels of 100 gross tons or over. Service on such sail essels engaged in the ocean or coastwise fisheries shall be accepted as eeting the requirements of this paragraph, or,

Fourth. One year's service as master or pilot of lake, bay, sound, river steam vessels of 150 gross tons or over, together with six onths' service in the deck department of ocean or coastwise steam ssels, or,

Fifth. Twenty-four months' service as a licensed first-class pilot steam vessels of 2,500 gross tons or over on the Great Lakes and her lakes, bays, or sounds, or,

Sixth. Three years' service in the deck department of ocean coastwise steam or sail vessels of less than 100 gross tons, togeth with one year's service in the deck department of ocean or coastwi steam vessels, or,

Seventh. Three years' service in the deck department of lake, ba or sound steam vessels, together with one year's service in the dec department of ocean or coastwise steam vessels, or,

Eighth. Three years' service in the deck department of stea vessels of 100 gross tons or over engaged in the ocean or coastwi fisheries. (Sec. 4440, R. S.)

### EXAMINATION FOR LICENSE AS THIRD MATE OF COASTWISE STEAM VESSELS.

35. An applicant for license as third mate of coastwise steam ve sels shall pass a satisfactory examination as to his knowledge of th following subjects:

1. Chart navigation.
2. Determination of distance from a fixed object.
3. International rules for preventing collisions at sea.
4. Marking lead line.
5. Storm signals.
6. Such further examination of a nonmathematical character a the local inspectors may require. (Sec. 4440, R. S.)

### INDORSEMENT OF MASTER'S OR MATE'S LICENSE AS PILOT.

36. Whenever a master or mate desires to act in the double capacit of master and pilot, or mate and pilot, and furnishes the necessar evidence of his qualifications, the local inspectors shall indorse suc pilot routes on the certificate of license. (Sec. 4443, R. S.)

### LICENSE OF OWNER AS MASTER OF STEAM YACHT.

37. Whenever the owner of a steam or sailing yacht of over 10 gross tons, who has reached the age of 21 years, and who has ha three years' experience in sailing such vessels, applies for a licens authorizing him to act as master of steam yachts for coastwise an ocean navigation, the local inspectors shall examine the applican as to his knowledge of the rules of the road, fog signals, signal light (inland and international); the use of the lead and line; the use o the patent and chip logs, the compass, variation and deviation o the compass, the use of the drag, the use of oil during storms, be signals between pilot house and engine room, handling of steam ves sels, laws of storms, course and distance by chart, keeping the lo book, middle latitude sailing, Mercator's sailing, method of obtainin latitude and longitude by dead reckoning, latitude by altitude o either the sun, moon, or stars; longitude by chronometer (tim sights). Practical problems shall be given in the subjects of latitud and longitude. The examination shall be in writing, which sha be kept on file in the office of the local inspectors. If said examina tion is satisfactory to the local inspectors, they shall issue to th applicant a master's license authorizing him to discharge the dutie of master of steam yachts, either for coastwise or ocean navigation (Sec. 4439, R. S.)

STER, MATE, AND PILOT OF STEAM PILOT, FISHING, PORTO RICAN, AND HAWAIIAN VESSELS.

38. Any applicant for original license to act as master of steam ot boats, or of steamers navigating the waters of the whaling ounds in the Alaskan seas, or of steamers engaged exclusively in e business of whale fishing, or of steamers engaged in the Atlantic, cific, or Gulf coast fisheries, or of steam or sail vessels navigating tween ports of the Hawaiian Islands, or between ports of the and of Porto Rico, shall have had at least three years' experience the deck department of such vessels, and except as hereinafter pro- ded, for an original license as mate the applicant shall have had two ars' experience in the deck department of such vessels, which fact all be verified by documentary evidence; and such applicant shall ly be subjected to such examination as shall satisfy the inspectors at the applicant is capable of navigating such vessels. *It is pro- ded*, That any person who has had at least five years' experience sail vessels licensed in the fisheries of the United States, two years which have been as master or mate of such sailing vessels, may examined for license as master or mate of steam fishing vessels to employed exclusively in the Atlantic, Pacific, and Gulf coast heries. The license issued under this section shall state in the dy thereof "for coastwise only," Pacific or Atlantic coast, as the se may be, and between what ports on either of said coasts.

*It is further provided*, That any applicant for original license no has had three years' experience in the deck department on steam lot boats, or who has had two years' experience in the deck depart- ent on steam pilot boats and one year's experience on sail pilot oats, shall be eligible for examination for license as mate of steam lot boats.

*It is further provided*, That said master's or mate's license may be dorsed as pilot on such inland waters on the above-named coasts the local inspectors at the various ports may find the holder quali- d to act on as pilot, after examination by the local inspectors, such amination to be in writing and preserved in the files of the in- ector's office. (Secs. 4439, 4440, 4442, R. S.)

ALIFICATIONS REQUIRED FOR LICENSE AS ENGINEER OF STEAM VES- SELS AND LICENSE FORMS REQUIRED.

39. No person shall receive an original license as engineer or assist- t engineer of steam vessels (except for license as engineer of saw- ill boats and pile drivers propelled by steam, and except for special ense as engineer of a steam vessel of any kind of 10 gross tons or nder on which a licensed engineer is required) who has not served least 36 months in the engineers' department of a steam vessel, a rtion of which experience shall have been obtained within the ree years next preceding the application: *Provided*, That any rson who has served three years as apprentice to the machinist trade a marine, stationary, or locomotive engine works, and any person no has served at least two years in the engineers' department of eam vessels together with 12 months' experience in the erec- on or installation of marine engines, and any person who has served

for a period of not less than three years as a locomotive stationary engineer, and any person graduated as a mechanic engineer from a duly recognized school of technology may be licens to serve as an engineer of steam vessels after having had not le than one year's experience in the engine department of steam ve sels, a portion of which experience shall have been obtained with the three years preceding his application, which fact shall be verifi by the certificate, in writing, of the licensed engineer or mast under whom the applicant has served, said certificate to be fil with the application of the candidate; and no person shall recei license as above, except for special license, who is not able to dete mine the weight necessary to be placed on the lever of a safety val (the diameter of valve, length of lever, distance from center of val to fulcrum, weight of lever, and weight of valve and stem bein known) to withstand any given pressure of steam in a boiler, who is not able to figure and determine the strain brought on th braces of a boiler with a given pressure of steam, the position an distance apart of braces being known, such knowledge to be dete mined by an examination in writing, and the report of examinatio filed with the application in the office of the local inspectors, and n engineer or assistant engineer now holding a license shall have th grade of the same raised without possessing the above qualification No original license shall be granted any engineer or assistant engine who can not read and write and does not understand the plain rul of arithmetic.

No person holding a special engineer's license shall be eligible fo examination for a higher grade of license until such person ha actually served two years under the authority of his license and on additional year in a subordinate capacity upon steamers requirin regularly licensed officers.

All licenses to engineers of steam vessels of 10 gross tons and unde shall be issued on Form 876, special license to engineers of stean vessels of 10 gross tons and under, and all other licenses to engineer of steam vessels shall be issued on Forms 876 (chief engineer's license and 877 (assistant engineer's license), according to grades of chie and assistant engineers specified.

Inspectors may designate upon the certificate of any chief or assist ant engineer the tonnage of the vessel upon which he may act. (Secs 4405, 4426, 4441, R. S.)

### CLASSIFICATION OF ENGINEERS.

#### CHIEF ENGINEER OF OCEAN STEAM VESSELS.

40. An applicant for license as chief engineer of ocean steam vessels shall be eligible for examination after he has furnished satis factory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as first assistant engineer of ocean o coastwise steam vessels; or,

Second. Two years' service as chief engineer of Great Lakes and all other lake, bay, or sound steam vessels of 1,000 gross tons o over; or,

Third. Three years' service as first assistant engineer of lake, bay or sound steam vessels of 1,000 gross tons or over; or,

Fourth. Any person holding a license as first assistant engineer of ocean or coastwise steam vessels who has had two years' service as second assistant engineer of ocean or coastwise steam vessels, or two years' combined service as first and second assistant engineer of ocean or coastwise steam vessels, while holding such license as first assistant engineer; or,

Fifth. One year's service as assistant engineer on ocean or coastwise steam vessels for license as chief engineer of steam vessels of 750 gross tons or under.

FIRST ASSISTANT ENGINEER OF OCEAN STEAM VESSELS.

41. An applicant for license as first assistant engineer of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as second assistant engineer of ocean or coastwise steam vessels; or,

Second. Two years' service as first assistant engineer of Great Lakes and all other lake, bay, or sound steam vessels of 1,000 gross tons or over; or,

Third. Two years' service as third assistant engineer of ocean or coastwise steam vessels, or two years' combined service as second and third assistant engineer of ocean or coastwise steam vessels; or,

Fourth. Three years' service as second assistant engineer of lake, bay, or sound steam vessels of 1,000 gross tons or over; or,

Fifth. Three years' service as oiler, water tender, or fireman in the engine department of ocean or coastwise steam vessels for license as first assistant engineer of steam vessels of 1,000 gross tons or under.

SECOND ASSISTANT ENGINEER OF OCEAN STEAM VESSELS.

42. An applicant for license as second assistant engineer of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as third assistant engineer of ocean or coastwise steam vessels; or,

Second. One year's service as first assistant engineer, or two years' service as second assistant engineer of Great Lakes and all other lake, bay, or sound steam vessels of 1,000 gross tons or over; or,

Third. Thirty-six months' actual service in the engine department of an ocean or coastwise steam vessel, 12 months of which shall have been as oiler or water tender; or,

Fourth. A journeyman machinist who has been engaged in the construction or repair of marine steam engines for two years, together with one year's service in the engine department of ocean or coastwise steam vessels.

THIRD ASSISTANT ENGINEER OF OCEAN STEAM VESSELS.

43. An applicant for license as third assistant engineer of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. Three years' service as fireman on ocean or coastwise steam vessels; or,

Second. Two years' service as oiler, or water tender, or combined service of two years in these positions, on ocean or coastwise steam vessels; or,

Third. One year's service as second assistant engineer on Great Lakes and all other lake, bay, or sound steam vessels; or,

Fourth. One year's service as chief or assistant engineer of river steam vessels, together with six months' service in the engine department of ocean or coastwise steam vessels; or,

Fifth. A graduate from the engineering class of a nautical school ship, the term of such engineering class to be based upon a period of two years; or,

Sixth. Three years' service as an apprentice to the machinist trade and engaged in the construction or repair of marine, stationary, or locomotive engines, together with one year's service in the engine department of ocean or coastwise steam vessels; or,

Seventh. Two years' service as a locomotive or stationary engineer, together with one year's service in the engine department of ocean or coastwise steam vessels; or,

Eighth. A graduate in mechanical engineering from a duly recognized school of technology, together with one year's service in the engine department of an ocean or coastwise steam vessel; or,

Ninth. Engineers of lake, bay, and sound steamers who have actually performed the duties of engineer for a period of three years shall be entitled to examination for engineer of ocean steamers, applicant to be examined in the use of salt water, method employed in regulating the density of the water in boilers, the application of the hydrometer in determining the density of sea water, and the principle of constructing the instrument; and shall be granted such grade as the inspectors having jurisdiction on the Great Lakes or seaboard may find him competent to fill. (Sec. 4441, R. S.)

### ENGINEERS OF MOTOR VESSELS.

44. The term "motor vessel" used in this section shall include any vessel of above 15 gross tons, propelled by gas, fluid, naphtha, or electric motors, carrying freight or passengers for hire.

No person shall receive an original license as engineer or assistant engineer of motor vessels who has not served at least 36 months in the engineers' department of a motor vessel, a portion of which experience shall have been obtained within the three years next preceding the application: *Provided*, That any person holding a license as engineer of steam vessels shall be eligible for license as engineer of motor vessels after having served for not less than three months as oiler in the engine department of motor vessels, or employed for not less than three months in the construction and installing of engines for motor vessels, which experience shall have been obtained within the three years next preceding the application; and any person who has served three years as apprentice to the machinist trade in a marine, stationary, or locomotive engine works, and any person who has served for a period of not less than three years as a locomotive or stationary engineer, and any person graduated as a mechanical engineer from a duly recognized school of technology may be licensed to serve as an engineer of motor vessels after having had not less than one year's experience in the engine department of motor vessels, a portion of which experience shall have been obtained within the three years next

preceding his application, which fact shall be verified by the certificate, in writing, of the licensed engineer or master under whom the applicant has served, said certificate to be filed with the application of the candidate.

No original license shall be granted any engineer or assistant engineer who can not read and write and does not understand the plain rules of arithmetic.

Inspectors may designate upon the certificate of any chief or assistant engineer the tonnage of the vessel upon which he may act. (Sec. 4426, R. S.)

CHIEF ENGINEER OF MOTOR VESSELS.

45. An applicant for license as chief engineer of motor vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as first assistant engineer of motor vessels; or,

Second. Two years' service as second assistant engineer of motor vessels, or two years' combined service as first and second assistant engineer of motor vessels; or,

Third. One year's service as assistant engineer on motor vessels for license as chief engineer of motor vessels of 750 gross tons and under; or,

Fourth. Any person holding a license as chief engineer of steam vessels who has served at least 30 days as licensed first assistant engineer of motor vessels; or,

Fifth. Any person holding a license as chief engineer of steam vessels, after having served as oiler in the engine department of motor vessels for not less than three months or employed for not less than three months in the construction and installation of engines for motor vessels; or,

Sixth. Any person who has served at least one year in the engine department of motor or steam vessels, or who has had at least two years' experience in the construction of marine motor engines and their installation, shall be eligible for examination for license as chief engineer of motor vessels of not over 150 gross tons. (Sec. 4426, R. S.)

FIRST ASSISTANT ENGINEER OF MOTOR VESSELS.

46. An applicant for license as first assistant engineer of motor vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as second assistant engineer of motor vessels; or,

Second. Two years' service as third assistant engineer of motor vessels, or two years' combined service as second and third assistant engineer of motor vessels; or,

Third. Three years' service as oiler in the engine department of motor vessels for license as first assistant engineer of motor vessels of 1,000 gross tons and under; or,

Fourth. Any person having served as chief engineer of steam vessels for a period of not less than three months may, upon examination, be granted a license as first assistant engineer of motor vessels.

Fifth. Any person holding a license as first assistant engineer of steam vessels, who has served at least 30 days as licensed second assistant engineer of motor vessels; or,

Sixth. Any person holding a license as first assistant engineer of steam vessels, after having served as oiler in the engine department of motor vessels for not less than three months or employed for not less than three months in the construction and installation of engines for motor vessels.

Seventh. Any person who has served at least one year in the engine department of motor or steam vessels, or who has had at least two years' experience in the construction of marine motor engines and their installation, shall be eligible for examination for license as first assistant engineer of motor vessels of not over 300 gross tons. (Sec. 4426, R. S.)

SECOND ASSISTANT ENGINEER OF MOTOR VESSELS.

47. An applicant for license as second assistant engineer of motor vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. One year's service as third assistant engineer of motor vessels; or,

Second. Thirty-six months' actual service in the engine department of motor vessels, 12 months of which shall have been as oiler; or,

Third. A journeyman machinist who has been engaged in the construction or repair of marine motor engines for two years, together with one year's service in the engine department of motor vessels as oiler; or,

Fourth. Any person having served as first assistant engineer of steam vessels for a period of not less than three months may, upon examination, be granted a license as second assistant engineer of motor vessels.

Fifth. Any person holding a license as second assistant engineer of steam vessels who has served at least 30 days as licensed third assistant engineer of motor vessels; or,

Sixth. Any person holding a license as second assistant engineer of steam vessels, after having served as oiler in the engine department of motor vessels for not less than three months or employed for not less than three months in the construction and installation of engines for motor vessels. (Sec. 4426, R. S.)

THIRD ASSISTANT ENGINEER OF MOTOR VESSELS.

48. An applicant for license as third assistant engineer of motor vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience:

First. Two years' service as oiler on motor vessels; or,

Second. A graduate from the engineering class of a nautical school ship, the term of such engineering class to be based upon a period of two years, after he has served at least six months as oiler on motor vessels, or employed at least six months in the construction and installation of engines for motor vessels; or,

Third. Three years' service as an apprentice to the machinist trade and engaged in the construction or repair of marine, stationary,

or locomotive engines, together with one year's service in the engine department of motor vessels as oiler; or,

Fourth. Two years' service as a locomotive or stationary engineer, together with one year's service as oiler on motor vessels; or,

Fifth. A graduate in mechanical engineering from a duly recognized school of technology, together with six months' service as oiler on motor vessels; or,

Sixth. Any person having served as second assistant engineer of steam vessels for a period of not less than three months may, upon examination, be granted a license as third assistant engineer of motor vessels; or

Seventh. Any person holding a license as third assistant engineer of steam vessels, after having served as oiler in the engine department of motor vessels for not less than three months or employed for not less than three months in the construction and installation of engines for motor vessels. (Sec. 4426, R. S.)

EXAMINATION OF BOILERS AND MACHINERY BY ENGINEER.

49. It shall be the duty of an engineer when he assumes charge of the boilers and machinery of a steamer to forthwith thoroughly examine the same, and if he finds any part thereof in bad condition, caused by neglect or inattention on the part of his predecessor, he shall immediately report the facts to the master, owner, or agent, and to the local inspectors of the district, who shall thereupon investigate the matter, and if the former engineer has been culpably derelict of his duty they shall suspend or revoke his license. (Sec. 4441, R. S.)

REPORTS OF ACCIDENTS, REPAIRS, AND UNSAFE BOILERS AND MACHINERY BY ENGINEERS.

50. Before making repairs to a boiler of a steam vessel the engineer in charge of such steamer shall report, in writing, the nature of such repairs to the local inspectors of the district wherein such repairs are to be made.

And it shall be the duty of all engineers when an accident occurs to the boilers or machinery in their charge tending to render the further use of such boilers or machinery unsafe until repairs are made, or when, by reason of ordinary wear, such boilers or machinery have become unsafe, to report the same to the local inspectors immediately upon the arrival of the vessel at the first port reached subsequent to the accident or after the discovery of such unsafe condition by said engineer. (Sec. 4441, R. S.)

## RULE VI.—INSPECTION OF VESSELS.

1. The annual inspection of any vessel subject to the provisions of Title LII, Revised Statutes of the United States, shall be made only on written application, presented to the United States local inspectors by the owner, master, or authorized agent of the vessel to be inspected. Such application shall state upon its face that previous application for inspection has not been made to any other board of local inspectors or supervising inspector. (Sec. 4417, R. S.)

2. Steam vessels employed by the Government, unless the titles of the same are actually vested in the United States, are not exempt from inspection. (Sec. 4400, R. S.)

3. Inspectors may lawfully inspect within their respective districts, upon proper application, any vessel running upon the waters of their district the certificate of which is about to expire. (Sec. 4417, R. S.)

4. In the inspection of hulls of vessels, the inspector of hulls shall carefully inspect every accessible part of the hull, and carefully examine the wood or metal of which the hull is constructed, to determine the condition of same, making all necessary hammer tests of hulls constructed of iron or steel. If the inspector shall not have satisfactory evidence otherwise of the soundness of the hull of a wooden vessel, he shall not give a certificate until the same shall be bored or opened up to his satisfaction.

The outboard shaft or shafts on every ocean or coastwise vessel shall be drawn for examination once at least in every three years. (Secs. 4405, 4417, R. S.)

5. Whenever any vessel is placed upon the dock for repairs it shall be the duty of the master, owner, or agent to report the same to the board of local inspectors of that district, so that a thorough inspection may by them be made to determine what is necessary to make such vessel seaworthy if the condition or age of the vessel, in the judgment of the inspectors, renders such examination necessary.

No repairs or alterations affecting the safety of the vessel, either in regard to hull or machinery, shall be made without the knowledge of the local inspectors. Notice of such repairs and changes is necessary, even if such work does not require the vessel to be placed in a dry dock, and even if there are no licensed officers attached to the vessel. (Sec. 4417, R. S.)

6. Certificates of inspection signed by one local inspector only shall not be valid, nor shall the name of a regular inspector be substituted by that of any other person upon any such certificate. This rule also applies to licenses. (Sec. 4421, R. S.)

7. Certificates of inspection for any period less than one year shall not be issued, but nothing herein shall be construed as preventing the revocation or suspension of certificates of inspection, in case such process is authorized by law.

Local inspectors issuing a permit to any vessel to proceed to other ports for repairs shall state upon the face of the same the conditions upon which it is granted and whether the vessel is to be allowed to carry freight or passengers, the quantity and number: *Provided, however,* That no vessel whose certificate had *expired* shall be permitted to carry passengers or freight while en route to another port for repairs.

When, under section 4456, Revised Statutes of the United States, vessels obtain a permit from the local inspectors of a district to go from their district to another to make repairs, said local inspectors shall notify the supervising inspector of their district, stating the repairs to be made on said vessels. The supervising inspector shall notify the supervising inspector of the district where such repairs are to be made, furnishing him a copy of the report of the inspectors indicating the repairs ordered on said vessels. (Secs. 4421, 4453, 4456, R. S.)

8. On and after July 1, 1911, the owner of every new vessel of over 100 gross tons, when making application for first inspection of the vessel, shall furnish the local inspectors of the district where the

vessel is to be inspected drawings or blue prints, in plan and section, showing fully the general construction of the vessel, of wood, iron, or steel, including dimensions, spacing of frames, disposition of hull plates, outside and in, or of outside and inside planks, construction of decks, construction of transverse and longitudinal bulkheads and location of same, space between decks, and details of principal scarfs, and shall also furnish a statement of the shapes, dimensions, and unit weights of all constructural parts of the hull and of the kinds of material of which made, including kinds of wood. A full description of the riveting of all parts of an iron or steel hull shall be furnished.

The drawings or blue prints and description of the vessel shall be retained in the office of the local inspectors making the first inspection of the vessel.

All vessels of 50 gross tons and over, under the jurisdiction of the Steamboat Inspection Service, shall have the draft of the vessel plainly and legibly marked upon the stem and upon the sternpost or rudderpost or at such other place at the stern of the vessel as may be necessary for easy observance. The draft shall be taken from the bottom of the lowest part of the keel to the surface of the water, the bottom of the mark to indicate the draft in feet. (Secs. 4405, 4417, R. S.)

9. In the inspection of hulls, boilers, and machinery of vessels, the rules promulgated by the American Bureau of Shipping respecting material and construction of hulls, boilers, and machinery, and the certificate of classification referring thereto, except where otherwise provided for by these rules and regulations, shall be accepted as standard by the inspectors of this service. (Secs. 4405, 4417, R. S.)

10. Sixty copies of all blue prints and (or) specifications of every article approved after July 1, 1927, for use on vessels subject to inspection shall be supplied to the Supervising Inspector General, for the use of supervising and local inspectors. (Sec. 4405, R. S.)

## Rule VII.—Duties of Inspectors.

1. Increases in the passenger allowance of any vessel, whether specified in regular certificate or by excursion permit, may be allowed only after personal inspection of the vessel by the local inspectors, or by the supervising inspector if he grants the increase, who must be satisfied that the vessel and her equipment justify the additional allowance, and of which inspection a written record shall be made and kept in the files of the office granting the allowance and a copy thereof forwarded to the office of the Supervising Inspector General. (Sec. 4466, R. S.)

2. No supervising inspector shall make his annual report public until after the same has been printed and made public by the department; and, further, no local board, or the clerk thereof, shall make public any report without the consent of their supervising inspector or that of the Supervising Inspector General. (Sec. 4410, R. S.)

3. It shall be the duty of the supervising inspectors to inform their respective local boards, in writing, of their decisions in cases of appeal. Supervising inspectors granting license to a vessel engaged in towing to carry persons in addition to its crew, under the act approved February 23, 1901, shall notify the local inspectors in whose jurisdiction the steamer receiving the permit is engaged, and the local inspectors shall keep a record of the same.

It shall be the duty of local inspectors to notify the local inspectors of adjoining districts, through the supervising inspector, of all revocations or suspensions of licenses, and also of the names of all persons from whom licenses have been withheld, the names of all steam vessels neglecting or refusing to make repairs when ordered, and the names of all that have been refused certificates, with the reasons therefor. (Secs. 4411, 4427, R. S.)

4. Whenever any inspector shall find it necessary, in conducting his investigations or in the performance of any of his duties, to obtain testimony from the inspectors of other districts, he shall request the same through the supervising inspector. (Sec. 4405, R. S.)

5. Inspectors, at their annual inspections of steam boilers, may cause to be removed from the surface of such boilers as are covered so much of said covering as may be necessary to enable them to examine parts of the boilers which can not be properly examined from the inside, and shall examine in a thorough and careful manner, when practicable, either externally or internally, all parts of the shell of every boiler; and the masters, engineers, and owners of every steam vessel shall afford every facility necessary to carry out in the most effective and efficient manner the provisions of this section, and in no case shall an intermediate inspection be deemed any part of the regular annual inspection. (Secs. 4405, 4418, R. S.)

6. It shall be the duty of inspectors when inspecting or reinspecting a vessel to carefully examine all steam pipes passing through woodwork, and if in their judgment the same are deemed unsafe they shall have them provided with air space and fitted with metal collars. (Secs. 4405, 4418, R. S.)

7. It shall be the duty of the inspector who inspects the boilers of any steamer to actually enter the boiler or boilers where it is possible to do so, and to thoroughly examine the interior of all such boilers to see that the braces are in place and of proper size, and to determine whether the boilers are in good condition, before granting a certificate of inspection, such examination to be made after the hydrostatic pressure has been applied. A record shall be made in the boiler inspector's report of inspection showing whether or not the inspector did actually enter the boiler, and if he did not enter the boiler, he shall give his reasons for not entering it. (Secs. 4405, 4418, R. S.)

8. It shall also be the duty of the inspectors to compel all floating structures, such as steam elevators (propelled by their own motive power), to have their whistles located on the front side of such superstructures having an elevation higher than the pilot house of the vessels. (Sec. 4405, R. S.)

9. All steam whistles shall be placed not less than 6 feet above the top of the pilot house of steam vessels where the height of the smokestack will admit the attachment of same below its top, when not hinged for passing under bridges, except upon steamers navigating the Red River of the North, Yukon and similar rivers, and rivers whose waters flow into the Gulf of Mexico, and steamers of less than 100 gross tons, whose steam whistles shall be placed not less than 2 feet above the tops of their pilot houses; and all double-end ferry steamers, and steamers similarly constructed, shall have a steam whistle both fore and aft of the smokestack, or one steam whistle on either the starboard or port side of the smokestack, so that the steam,

when whistle is blown, can be seen from either end of steamer; and it shall be the duty of inspectors to enforce this rule at the annual inspection. (Sec. 4405, R. S.)

10. It shall be the duty of both the hull and boiler inspectors to be present when the boiler is being tested by hydrostatic pressure, and the hull inspector, as well as the boiler inspector, shall observe and note the indication upon the gauge.

It shall also be the duty of both the hull and boiler inspectors to examine all pumps, hose, and other fire apparatus and to see that the hose is subjected to a pressure of 100 pounds to the square inch, and that the hose couplings are securely fastened in accordance with these rules.

It shall be the duty of the local inspectors to require all ocean passenger or freight steamers of 500 gross tons and upward, except paddle-wheel steamers, to be equipped with an efficient mechanical deep-sea sounding apparatus, in addition to the ordinary deep-sea hand lead. The mechanical deep-sea sounding apparatus above required shall be installed, kept in working order, and ready for immediate use. (Secs. 4405, 4417, 4418, R. S.)

11. Local boards shall report forthwith to their supervising inspectors in detail all accidents of a serious character—such as collisions, founderings, sinkings, fires—and all other casualties of interest to or affecting the steamboat service in their respective districts. (Sec. 4405, R. S.)

12. Local inspectors shall report, for each fiscal year, as soon as practicable after the end of each fiscal year, to their supervising inspectors, all vessels inspected, arranged according to class and grade; all examinations into alleged violations of the laws regulating vessels, and the action taken in relation to the same; all investigations and decisions by local inspectors; all cases of appeal and the result thereof; casualties and investigations of same; the names of all persons licensed; the names of all whose licenses have been suspended or revoked; the names of all persons from whom licenses have been withheld; and shall render all other annual reports required by the regulations of the Department. These reports, together with any other annual reports that may be submitted by supervising and local inspectors, shall be forwarded by supervising inspectors to the Supervising Inspector General. (Secs. 4410, 4411, R. S.)

13. When it is known or comes to the knowledge of the local inspectors that any steam vessel is or has been carrying an excess of steam beyond that which is allowed by her certificate of inspection, the local inspectors in whose district said steamer is being navigated, in addition to reporting the fact to the United States district attorney for prosecution under section 4437, Revised Statutes of the United States, shall require the owner or owners of said steamer to place on the boiler of said steamer a lockup safety valve that will prevent the carrying of an excess of steam and shall be under the control of said local inspectors.

On the placing of a lockup safety valve upon any boiler, it shall be the duty of the engineer in charge of same to blow or cause the said valve to blow off steam at least once in each watch of six hours or less, to determine whether the valve is in working order, and it shall be the duty of the master of such vessel to see that this rule

is observed, and it shall be the duty of the master and engineer to report to the local inspectors any failure of such valve to operate.

In case no such report is made, and a safety valve is found that has been tampered with or out of order, the license of the engineer having such boiler in charge and the license of the master of such vessel shall be suspended or revoked.

It shall be the duty of the local inspectors to send a copy of this rule to every steamer in their district when said copies are furnished by the Department. (Secs. 4418, 4437, R. S.)

14. All official records and official documents on file in the office of any supervising inspector or board of local inspectors, after official action thereon has been concluded, may be open to public inspection and examination: *Provided,* That such inspection or examination be made in the office to which such official records and documents belong. (Sec. 4405, R. S.)

15. It shall be the duty of the inspectors when inspecting or reinspecting a vessel to see that all exposed and dangerous places, such as gears and machinery, are properly protected with covers, guards, or rails, in order that the danger of accidents may be minimized, and on vessels equipped with radio (wireless) the lead-ins shall be efficiently incased or insulated to insure the protection of persons from accidental shock. Such lead-ins shall be located so as not to interfere with the launching of lifeboats and life rafts. (Secs. 4405, 4417, R. S.)

16. When inspectors have any reason to question the stability of any vessel under their jurisdiction, they shall require the owners of the vessel to make inclining tests on such vessel, under the supervision of the Supervising Inspector General.

On and after July 1, 1924, every passenger or ferry vessel of 500 gross tons or over, propelled by machinery, and every passenger or ferry vessel intended to carry 50 or more passengers, in either case when making application for first inspection to carry passengers, shall be subjected to an inclining test conducted under the supervision of the Supervising Inspector General, and the results of the test shall be approved before the vessel shall be certificated.

The owner or builder of every vessel described in the second paragraph of this section shall, as soon as possible, furnish the local inspectors of the district where the vessel is to be inspected drawings or blue prints, as follows: Sheer, half breadth and body plans, midship section, inboard profile, floors, framing, bulkheads, arrangement of decks and quarters; general arrangement and location of boilers and machinery, plan and elevation; plan and elevation sections through holds, tanks, bunkers, double bottoms, and compartments; capacity plan of the bunkers, tanks, holds, double bottoms, and compartments; and the following curves: Displacement, vertical center of buoyancy, transverse metacenter, longitudinal center of buoyancy, longitudinal metacenter, center of gravity of water planes from either perpendicular, moment to alter trim, and tons per inch; except for double-end ferry boats, then the drawing or blue print of curves will only be required to show the displacement, vertical center of buoyancy, transverse metacenter, and tons per inch. The drawings and blue prints required by this paragraph shall be forwarded, upon receipt of same, by the local inspectors to the Supervising Inspector General.

Where vessels are required to carry fixed ballast, in order to increase the metacentric height, such ballast shall not be moved except for examination and repair of vessel, and then only in the presence of an inspector of this Service.

The local inspectors shall place a notation in regard to the inclining data on the upper right-hand corner of the certificate of inspection of every vessel subject to this rule, to read as follows: Data relating to the stability of this vessel is on file in the office of the Supervising Inspector General, Washington, D. C.

The local inspectors shall require the master of every vessel subject to this rule to frame, under glass, and post in the master's room a stability certificate to be provided by the Supervising Inspector General: *Provided,* That, where there is no master's room, such certificate shall be posted in the pilot house.

It shall be the duty of the inspectors to determine that the stability certificate is posted and make a notation in Form 840A when inspecting or reinspecting vessels subject to this rule. (Sec. 4405, R. S.)

17. It shall be the duty of the inspectors when inspecting or reinspecting vessels to carefully examine all air ports and deadlights in the hull, and to satisfy themselves that the same are safe. (Secs. 4405, 4417, R. S.)

18. It shall be the duty of the inspectors when inspecting or reinspecting vessels to carefully examine the lifeboat-disengaging apparatus and the blocks and falls thereof and to satisfy themselves that the same are in good condition. (Secs. 4405, 4417, R. S.)

## Rule VIII.—Ocean and Coastwise Steam Yachts.

(Authority: Sections 4405 and 4488, R. S. and Seamen's Act.)

### CLASSES.

1. Ocean and coastwise steam yachts shall be divided into the following classes:

(a) Steam yachts navigating more than 20 nautical miles offshore.

(b) Steam yachts navigating 20 nautical miles or less offshore.

### LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (a).

2. Vessels of class (a) shall be required to have lifeboat and life-raft capacity for all persons on board. Not less than 75 per cent of the total capacity shall be in lifeboats and 25 per cent may be in collapsible lifeboats or rafts of an approved type.

### LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (b).

3. Vessels of class (b) shall be required to have lifeboat and life-raft capacity to accommodate all persons on board. Not less than 75 per cent of the total capacity shall be in lifeboats and 25 per cent may be in approved collapsible lifeboats or life rafts.

Vessels of class (b) during the interval between May 15 and October 15 in any one year, both dates inclusive, shall only be required to be equipped with lifeboats and life rafts to accommodate 70 per cent of all persons on board, not less than 50 per cent of which shall be in lifeboats and 50 per cent may be in collapsible lifeboats or life rafts of an approved type.

SIZE OF LIFEBOATS.

4. The size of lifeboats on vessels of classes (a) and (b) shall be of at least 125 cubic feet capacity. The supervising inspector of the district in which the vessel is inspected may, if he deems it proper, modify the requirements as to the size of lifeboats.

AIR TANKS.

5. All lifeboats on vessels of class (a) shall be provided with air tanks. The construction and arrangement shall be as required in section 30, Rule III, Ocean: *Provided*, That when motor lifeboats are subdivided with a suitable number of efficient bulkheads, the air tanks may be dispensed with.

6. Only the metal lifeboats on vessels of class (b) shall be required to be provided with air tanks.

CARRYING CAPACITY OF LIFEBOATS.

7. The carrying capacity of lifeboats on vessels of classes (a) and (b) shall be computed as provided in section 15, Rule III, Coastwise.

DAVITS OR CRANES.

8. Lifeboats shall, when practicable, be carried under substantial davits or cranes.

MARKING OF LIFEBOATS.

9. Each lifeboat shall be provided with a suitable name board, or the name of the vessel shall be marked on the bow or stern of the lifeboat.

EQUIPMENT FOR LIFEBOATS.

10. Only lifeboats of more than 180 cubic feet capacity are required to be equipped as provided in section 9, Rule III, Coastwise. The equipment may be kept on board the steamer ready for use.

DRAWINGS, SPECIFICATIONS, NAME PLATE.

11. All lifeboats shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the lifeboats are built.

Builders of lifeboats shall affix a plate or other device to each lifeboat, having thereon the builder's name, number of boat, date of construction of boat, cubical contents of boat, and number of persons said boat will carry, as determined by the rules of the Board of Supervising Inspectors.

INSPECTION OF LIFEBOATS WHEN BUILT.

12. Supervising inspectors of districts where lifeboats are built shall detail an assistant or local inspector to any place where lifeboats are being built, whose duty it shall be to carefully inspect and examine the construction of such lifeboats, and he shall satisfy himself that such lifeboats are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the boat he shall stamp his initials, together with letters "U. S. I." on a blank space on the plate required to be affixed to the boat by the builder. The initials of the assistant or local inspector shall be satisfactory

evidence to all parties interested that the boat has been constructed in accordance with the drawings, or blue prints, and specifications on file.

LIFE PRESERVERS.

13. These vessels shall be equipped with an approved life preserver for each person on board.

FIRE APPARATUS.

14. Pleasure steamers shall be provided with at least one double-acting steam fire pump.

Fire mains shall be led from the pumps to all decks with a sufficient number of outlets arranged so that all parts of the vessel may be reached with water.

Suitable hose with nozzles and spanners shall be provided, but it shall not be necessary that the hose be coupled to hydrants, but shall be convenient to the hydrants in case of fire.

FIRE BUCKETS, AXES, AND FIRE EXTINGUISHERS.

15. Fire buckets, axes, and fire extinguishers shall be provided in accordance with the tables in Rule IV.

LIFE BUOYS.

16. Steam yachts shall be equipped with ring buoys with attached self-igniting water lights as provided for passenger steamers of corresponding length.

INSPECTION.

17. The inspection of hulls, boilers, and appurtenances thereto shall be strictly in compliance with the United States Revised Statutes and the rules and regulations.

## Rule IX.—Miscellaneous.

1. Steamers using the bell signals between the pilot house and engine room shall have a tube, of proper size, so arranged as to return the sound of the bell signals to the pilot house, and shall also be provided with a speaking tube or other device for the purpose of conversation between pilot house and engine room.

Nothing in the above shall be construed to prevent the use of the so-called telegraph now in use for conveying signals from the pilot house to the engine room, but in all cases where the telegraph is used the signal shall be repeated back.

On all steamers where the distance is more than 150 feet between deck houses, a wire cable shall be stretched between the deck houses at all times when the vessel is loaded and being navigated, this cable to be not less than 5 feet from the deck; and there shall be attached at all times to the cable a traveler with a line of sufficient continuous length to insure its operation, in order that communication between both ends of the vessel may be facilitated at all times: *Provided*, That, in addition to the traveler with the endless whip, as many loose rings with lanyards attached may be placed on the cable as may be deemed necessary by the master in charge of the vessel. Failure to have such cable stretched and traveler attached at all times when the vessel is loaded and being navigated shall be sufficient cause for the suspension of the license of the master or officer in charge.

On all steamers where the distance is more than 150 feet between perpendiculars of pilot house and forward part of the engine room there shall be communication by means of a telephone between the pilot house and engine room, such telephone to be installed in lieu of a speaking tube. (Secs. 4405, 4417, R. S.)

2. Inspected motor vessels shall be provided with an efficient whistle sounded by steam or by some substitute for steam to give the necessary whistle signals. (Sec. 4405, R. S.)

3. All steam vessels of over 100 gross tons shall have all sleeping accommodations equipped with an alarm bell unless there is a watchman always on duty in such apartment or the apartment is so situated and arranged that the inspectors consider such bell unnecessary or dangerous. Where electric bells are installed they shall be operated by a switch from the pilot house or bridge. (Sec. 4405, R. S.)

4. The master of every seagoing vessel shall, whenever leaving port, enter the maximum draft of his vessel in the log book. (Sec. 4405, R. S.)

5. None of the inflammable articles specified in section 4472, Revised Statutes, or oil that will not stand a fire test of 300° F. shall be used as stores on any pleasure steamer or steamer carrying passengers, except that vessels not carrying passengers for hire may transport gasoline or any of the products of petroleum for use as a source of motive power for the motor boats or launches of such vessels. (Sec. 4472, R. S.)

6. Refined petroleum which will not ignite at a temperature of less than 110° F. may, upon routes where there is no other practicable mode of transporting it, be carried on passenger steamers; but it shall not be lawful to receive on board or transport any petroleum unless the owner or master of the steamer shall have first received from the inspectors a permit designating the place or places on such steamer in which the same may be carried or stowed, with the further condition that the permit shall be conspicuously posted on the steamer.

Refined petroleum shall not in any case be received on board or carried unless it is put up in good iron-bound casks or barrels or in good metallic cans or vessels, carefully packed in boxes, and the casks, barrels, or boxes plainly marked on the heads thereof with the shipper's name, the name of the article, and the degree of temperature (Fahrenheit) at which the petroleum will ignite.

Lubricating oils shall be stored in secure tanks, casks, or cans in the engine-room compartments or storeroom, or in metal-lined lamp lockers or oil rooms. Kerosene or other illuminating oils meeting the requirements of the law shall be stored in metallic tanks or cans, and carried in the oil rooms or lamp lockers constructed in accordance with the General Rules and Regulations. (Sec. 4472, R. S.)

7. Vessels carrying passengers or freight for hire permitted under the authority of the act of Congress approved October 22, 1914, amending section 4472, Revised Statutes of the United States, to transport and use gasoline or any of the products of petroleum for the operation of engines to supply an auxiliary lighting and wireless system independent of the vessel's main power plant, shall be allowed to carry not to exceed 40 gallons of gasoline or any of the products of petroleum for such purposes when contained in a seamless or lapwelded steel tank, cylindrical in form, not less than one-fourth

(0.25) of an inch thick, and of a capacity of at least 10 per cent more than the volume of the contents. The tank shall be tinned on the inside and tested to 300 pounds pressure to insure tightness, and fitted with a vent pipe of ample capacity, with no angles in pipe greater than 45°, opening to the atmosphere at a point not less than 10 feet above the highest house, the vent pipe to end with a U bend with the opening protected by wire gauze. The filling pipe or cap shall be entirely independent of other connections. The tank shall be carried on the highest deck of the steamer and so located that there may be a free circulation of air all around it.

Steamers engaged in transoceanic service or on voyages of more than 10 days' duration in either direction may carry such quantities of gasoline or any of the products of petroleum as may be necessary to supply an auxiliary service already installed, the tanks already installed and the location of same being allowed for this purpose. On steamers where the auxiliaries are maintained by engines using the heavy oils, the oil may be carried in quantities not to exceed 15 tons, when contained in iron or steel tanks of sufficient strength to withstand the action of sea or temperature, and so located as to be properly insulated or ventilated if either is necessary.

All tanks shall be firmly and properly secured to prevent being torn away from beds or saddles by heavy weather or excessive list of the ship, and shall be the object of daily inspection by the officers of the ship intrusted with their care.

There shall be placed within 5 feet of every tank containing gasoline, benzine, or naphtha not less than two fire extinguishers of approved carbon tetrachloride or foam types which have demonstrated a capacity for extinguishing burning gasoline and other inflammable liquids, which fire extinguishers shall be in addition to fire extinguishers already required. (Sec. 4472, R. S.)

See page 186 for list of approved tetrachloride and foam-type fire extinguishers.

8. The fuel-oil tanks on all ocean steamers subject to the rules and regulations of the Steamboat Inspection Service shall be constructed of material of such thickness and workmanship as, in the judgment of the inspector in whose district the installation is made, is safe.

Application for permission to use petroleum as fuel shall be made in duplicate to the supervising inspector of the district in which the vessel is at the time she is equipped to use oil as fuel. Application to use petroleum as fuel shall be made on the blanks furnished for that purpose. Two blue prints or tracings showing the proposed installation of the tanks, pumps, piping, valves, and burners shall accompany the application.

On all vessels of over 500 gross tons using oil as fuel there shall be in each fireroom a metal tank containing 50 gallons of sand, fitted with a scoop or shaker, for fire purposes; also two or more approved fire extinguishers of not less than 2½ gallons capacity nor more than 5 gallons capacity each, placed accessible to the fireroom and ready for immediate use: *Provided, however,* That steamers of 500 gross tons and under using oil as fuel may be fitted with metal tanks containing 25 gallons of sand, and one approved fire extinguisher of not less than 2½ gallons capacity nor more than 5 gallons capacity.

All pipe connections on fuel-oil tanks and cargo-oil tanks, except the connection or connections on the top of such tank, shall be pro-

tected by an internal gate valve operated by an extension rod leading to an accessible point, in an open space on a deck, outside the engine and fireroom casing, so that the flow of oil may be immediately shut off in case of the failure or rupture of any of the pipes or connections. (Sec. 4474, R. S.)

9. All steamers navigating the ocean during the nighttime shall have a lookout at all times at or near the bow and one watchman in each cabin and steerage. (Sec. 4477, R. S.)

10. All watchmen shall be under the direct charge of the master or officer in command of the vessel, and each shall report to the officer in command at the pilot house at fixed intervals of not longer than every hour. (Sec. 4477, R. S.)

11. All passenger steamers shall, in addition to the regular pilot on watch, have one of the crew also on watch, in or near the pilot house; and this rule applies to all steamers navigating in the nighttime. (Sec. 4477, R. S.)

12. Any master or pilot of any steam vessel who shall flash or cause to be flashed the rays of the searchlight into the pilot house of a passing vessel shall be deemed guilty of misconduct and shall be liable to have his license suspended or revoked. (Sec. 4405, R. S.)

13. The efficient fog bell required upon vessels by law shall be held to mean a bell not less than 8 inches in diameter from outside to outside and constructed of bronze or brass or other material equal thereto in tone and volume of sound, and located where the sound shall be the least obstructed. (Sec. 4405, R. S.)

14. Unnecessary sounding of the steam whistle is prohibited within any harbor limits of the United States. Whenever any licensed officer in charge of any steamer authorizes or permits such unnecessary whistling, upon conviction thereof before any board of inspectors having jurisdiction, such officer shall be suspended from acting under his license as the inspectors trying the case may deem proper. (Sec. 4405, R. S.)

15. Any master or pilot of any steam vessel who shall authorize or permit the carrying of any light, electric or otherwise, not required by law, on the outside structure of the cabin or hull of the vessel that in any way will interfere with distinguishing the signal lights shall, upon conviction thereof before any board of inspectors having jurisdiction, be deemed guilty of misconduct and shall be liable to have his license suspended or revoked. (Secs. 4405, 4450, R. S.)

16. On and after July 1, 1920, all steamers of the United States subject to the regulations of this Service, engaged in the passenger service, which are electrically lighted by dynamos located below the deep-load line of the vessel shall have on board an auxiliary lighting system located above the deep-load line to light the steamer sufficiently to enable passengers and crew to find their way to the exits, which auxiliary lighting system shall be ready for use in case of failure of the main lighting plant and to be so installed and arranged that all auxiliary lights may be switched on from a central station. Where such auxiliary lights are served by storage batteries, arrangements shall be such that the auxiliary lights and alarm bells will be put in service separately or together by one operation from the pilot house or navigator's bridge: *Provided, however,* That where oil lamps are used as auxiliary lights, such oil lamps shall be kept lighted between the hours of sunset and sunrise while such vessels to which

this section applies are being navigated, or while passengers are on board: *Provided further*, That cabin watchmen and cabin patrols on duty in the nighttime on all vessels with staterooms to which this section applies shall have in their possession while on such patrol duty a suitable and efficient dry-battery flash light.

17. It shall be the duty of the master of any vessel under the jurisdiction of the Steamboat Inspection Service to assure himself, before proceeding to sea, that all the cargo hatches of his vessel are properly covered and the covers secured. The covers of all exposed hatches shall be made water-tight by the use of pliable gaskets or by heavy canvas tarpaulins, thoroughly covering the hatch cover and firmly secured by iron or steel bars extending from side to side or end to end of the hatchway, which bars shall be securely fastened by toggles or wedges made of hardwood or by the use of efficient screw fastenings. Failure by the master of any vessel to observe this regulation shall be sufficient cause for suspension or revocation of his license on a charge of inattention to his duty. (Secs. 4405, 4417, R. S.)

18. On all vessels contracted for after June 30, 1928, using electricity for any purpose, the installation shall be in keeping with the best modern practice.

Wires shall be armored or run in approved iron conduits or moldings.

Iron conduit or armored casing shall be required in bunkers, cargo spaces, storerooms, etc., and in all places where the leads are liable to mechanical injury. Joints in wiring shall be avoided as far as possible in the above-named spaces, and where joints are necessary they shall be made in metal boxes, readily accessible and protected in the same manner as the leads.

When wires are led through beams, frames, or nonwater-tight bulkheads, they shall be carried either in iron conduits, armored casing, or protected by hard rubber, or other equivalent bushings.

When wires are carried through water-tight decks or bulkheads, they shall be provided with a suitable stuffing box at deck or bulkhead. Where such points are liable to mechanical injury, they shall be protected by suitable boxes or cages.

In locating the wiring system as a whole, care shall be taken to provide accessibility for examination and repair. Special care shall be taken to avoid any arrangement which might permit the lodgment of standing water, and when necessary, openings in conduits or drains shall be installed to accomplish this purpose.

All fixtures, taps, joints, and splices shall be fitted with metal boxes. Boxes in cargo and machinery spaces, galley, and those exposed to weather shall be water-tight.

Splices shall be so joined as to be both mechanically and electrically secure without solder. They shall then be soldered and properly insulated and further protected by waterproof tape.

Changes or alterations in the electrical installations of vessels now in service shall be in accordance with this rule.

Special attention shall be given by the inspectors in the examination of present installation to see that it is of such nature as to preclude any danger of fire, giving particular attention to wiring which is carried through wooden bulkheads, partitions, etc. (Secs. 4405, 4417, R. S.)

19. On all ocean vessels under the jurisdiction of the Steamboat Inspection Service making voyages of more than 48 hours' duration, the entire steering gear, the whistle, the means of communication and the signaling appliances between the bridge or pilot house and engine room shall be examined and tested by a licensed officer of the vessel within a period of not more than 12 hours before leaving port. All such vessels making voyages of less than 48 hours' duration shall be so examined and tested at least once in every week. The fact and time of such examination and test shall be recorded in the ship's log book. (Sec. 4405, R. S.)

20. Steamers more than 150 feet in length under the jurisdiction of the Steamboat Inspection Service carrying passengers or passengers and freight and contracted for after June 30, 1927, shall, if the boiler-room compartment extends above the main or other decks, have same protected through all such decks by surrounding iron or steel bulkheads and the funnel or funnels protected by an iron or steel trunk or casing extending through and past all decks above their connection with the boiler-room compartment, and in such steamers where the boiler-room compartment does not extend above the main deck the funnel or funnels shall be protected by an iron or steel trunk or casing extending through and past all decks above their connection with the boiler or breeching. If the engine-room compartment extends above the main or other decks, same shall be protected through all such decks by surrounding iron or steel bulkheads and by an iron or steel ventilating shaft extending through and past the upper deck: *Provided*, That if such surrounding (engine-room) bulkheads are fitted with windows, the glass therein must be of a fire-resisting quality, fitted in stationary metal sash frames.

On and after December 31, 1916, all steamers carrying passengers, and which also carry freight upon the main deck which is accessible to passengers or crew while being navigated, shall have installed in such main-deck freight space an efficient overhead water-sprinkling system.

The crew and passenger sleeping accommodations located below the main deck on steamers engaged in the passenger traffic shall have installed therein an efficient overhead water-sprinkling system, unless such quarters and the bed frames therein are constructed of metallic or noncombustible material, thereby making them practically fireproof.

On steamers carrying passengers where the kitchens or galleys are located below the main deck, there shall be installed in such kitchens or galleys an efficient overhead water-sprinkling system. This paragraph shall become effective July 1, 1917.

The water-sprinkling system above referred to shall be reliable and efficient and so located that the volume of discharge shall be sufficient to entirely cover or blanket the freight in case of fire, and to entirely and fully sprinkle the compartment in which the passengers or crew may be accommodated below deck, and be installed in such manner as to be easily and quickly accessible of operation, and shall be ready for service at all times when freight or passengers are on board. The operating valves for the sprinkling system shall be suitably marked. (Secs. 4405, 4417, 4418, 4472, R. S.)

21. It shall be the duty of the master and chief engineer of any vessel under the jurisdiction of the Steamboat Inspection Service to see that such vessel and the passenger and crew's quarters are

kept in a sanitary condition. Failure on the part of the master (or chief engineer so far as it applies to the engineers' department) of any vessel to observe and carry into effect this section shall be sufficient cause for the suspension of his license on a charge of inattention to his duties.

22. It shall be the duty of the chief engineer of any steam vessel under the jurisdiction of the Steamboat Inspection Service to report promptly to the local inspectors who made the last annual inspection of such steam vessel, every renewal of every fusible plug inserted in a boiler or boilers of the steam vessel upon which they are in charge as chief engineer. Such report shall be made upon the form provided for such purpose (or by letter in writing) setting forth:

1. Name of steamer and gross tonnage thereof.
2. Date fusible plug or plugs were inserted in boiler or boilers.
3. Number of boilers in steamer.
4. Description of boiler or boilers in the steamer (manufacturer's number on boiler, by location or otherwise, so that boiler may be identified; and, if a fusible plug is inserted in the crown sheet of a separate combustion chamber, the location of combustion chamber should be stated).
5. Name of the manufacturer of the fusible plugs.
6. Manufacturer's mark on casing of fusible plugs.
7. Heat number on both ends of filling of fusible plugs.
8. Diameter of filling at smaller end of fusible plugs.
9. Steam pressure allowed to boiler by last certificate of inspection.
10. Number of such fusible plugs inserted.
11. Length of time that removed plugs have been in service.
12. If the length of time that a fusible plug has been installed in a boiler exceeds six months, state the length of time that the steamer has been out of service and boiler not in use since the removed plug was placed in boiler, and under "Remarks" such other information as may be of interest and value to the inspectors of the Steamboat Inspection Service.

Neglect of the chief engineer of a steamer to give this matter prompt attention may result in the suspension or revocation of his license. (Secs. 4405, 4417, R. S.)

23. No lifeboat, lifeboat-disengaging apparatus, life raft, life preserver, fire extinguisher, fire-extinguishing apparatus, or other equipment required to be approved by Title LII, Revised Statutes, shall be used on any vessel inspected and certificated by this service which shall not first be approved by the Board of Supervising Inspectors and also by the Secretary of Commerce. (Sec. 4491, R. S.)

## RULES OF PRACTICE IN INVESTIGATIONS AND TRIALS.

### ULES OF PRACTICE FOR THE GOVERNMENT OF LOCAL INSPECTORS, STEAMBOAT INSPECTION SERVICE, IN INVESTIGATIONS OF CASUALTIES TO VESSELS UNDER THE JURISDICTION OF THE STEAMBOAT INSPECTION SERVICE AND OF VIOLATIONS OF LAW OR OF THE RULES AND REGULATIONS THEREUNDER BY LICENSED OFFICERS.

1. When it has come to the knowledge of any board of local nspectors that an accident has occurred within its district to a essel under the jurisdiction of the Steamboat Inspection Service uch board shall at once investigate the conditions and circumtances under which the accident occurred, unless the Supervising nspector General directs that the investigation be conducted by ome other board of local inspectors than that of the district in vhich the accident occurred.

2. In conducting the investigations referred to in section 1 the oard of local inspectors shall by personal observation or by the estimony of witnesses determine, so far as may be possible, the esponsibility of any licensed officer for the accident. If it is conluded that no licensed officer is responsible, the investigation may e closed and the case dismissed; but if any licensed officer be conluded to be responsible, the board of local inspectors shall imnediately prefer charges against him and cite him to trial under the harges.

3. In cases where complaint or charges have been filed by any erson against a licensed officer no investigation is necessary, and he board of local inspectors shall immediately cite the defendant o trial under the charges as preferred, and the trial shall determine he guilt or innocence of the defendant.

### RULES OF PRACTICE FOR THE GOVERNMENT OF SUPERVISING AND LOCAL INSPECTORS, STEAMBOAT INSPECTION SERVICE, IN TRIALS OF LICENSED OFFICERS OF VESSELS.

#### I. SUSPENSION AND REVOCATION OF LICENSES.

1. The inspectors shall, when the charges have been duly filed against a licensed officer of vessel, furnish the accused with a copy thereof, setting forth specifically their character and the section of the statutes or the rules of the board that have been violated, and cite him to appear for trial upon a certain day.

2. Subpœnas shall be in the prescribed form, one copy of which shall be furnished each witness.

3. All testimony shall be reduced to writing. The accused shall be permitted to be represented by counsel and to cross-examine witnesses, and in case of exceptions to questions for any cause the inspectors shall note the exceptions in the margin of the deposition.

The deposition shall be sworn to before an officer authorized t administer oaths.

4. The accused may have the hearing of the case continued upc the presentation of reasons satisfactory to the board, and the boar may, in like manner, continue the hearing from day to day.

5. During the trial the witnesses shall be examined separatel but if the accused is also a witness he shall not be subject to this rul

6. At any time before the conclusion of the evidence the charg or charges, if being tried on charges, may be amended, notice of sai amendment being furnished to the accused of the nature of suc amendment, but no amendment shall be permitted after the conclu sion of the evidence.

7. Where the witnesses reside in a district other than that in whic the accused is being tried, a certified copy of the charges, togethe with such interrogatories as the inspectors desire to propound, ma be forwarded to the inspectors of the district where the witnesse reside, and said inspectors shall examine the witnesses in the sam manner as prescribed in section 3 of this rule.

8. The testimony thus taken shall be forwarded to the inspector investigating the case and read as evidence in the cause, the same a though such testimony had been taken by the inspectors trying th same.

9. The inspectors shall furnish the accused with a statement i writing of their finding in the premises.

10. A copy of testimony taken at a trial by any board of loca inspectors shall be given to the accused or his representative whe request for same is made. (Secs. 4448, 4449, 4450, R. S.)

### II. APPEAL TO SUPERVISING INSPECTORS.

1. The supervising inspector, upon notice of an appeal from th decision of the local board, provided said notice of appeal shall b made within 30 days from the date of the decision of the local board shall give notice in writing to said local board to forward a certifie copy of their decision, together with the charges and all evidence i writing on file in their office.

2. The supervising inspector shall then proceed to investigate th case under the same rules prescribed for the trial of the accused b the local board.

3. The testimony taken before the local board may be considere by the supervising inspector for the purpose of determining whethe the finding of the local board is justified by the evidence, and he shal have power to remand the same for explanation or correction.

4. Upon the conclusion of the case the supervising inspector shal furnish the appellant with a notice of his finding in like manner a prescribed for local inspectors. (Act of Congress approved June 10 1918.)

### III. APPEAL TO SUPERVISING INSPECTOR GENERAL.

1. The Supervising Inspector General, upon notice of appeal fron the decision of the supervising inspector, provided said notice o appeal shall be made within 30 days from the date of the decision o the supervising inspector, shall proceed to review the case under th

ame procedure as that of the supervising inspector in cases of appeal, nd the decision of the Supervising Inspector General in such cases hall, when approved by the Secretary of Commerce, be final. (Act f Congress approved June 10, 1918.)

### IV. PUBLICITY IN HEARINGS AT INVESTIGATIONS AND TRIALS.

1. All hearings at investigations and trials shall be open to the ublic generally and to all who may be interested.

2. At such hearings the principals may be represented by counsel, being understood that questions by counsel at *investigations* shall e presented through the inspectors hearing the case; and no cross-xamination by counsel shall be permitted at *investigations*.

# NSTRUMENTS, MACHINES, AND EQUIPMENTS APPROVED FOR USE ON VESSELS.

[Year in which approved is given in parentheses.]

## LIFEBOATS.

American Balsa Co., Long Island City, N. Y. Nesting type lifeboat, rated as ass 1A. (1922.)
Aniello lifeboat. (1895.)
Wm. H. Appleton, New York, N. Y., Gaskin reversible lifeboat. (1918.) Rated second class 2A, and life raft. (1919.)
Baswitz lifeboat, Gustav H. Schwab, New York, N. Y. (1897.)
P. R. Beaupré, Metropolis, Ill., automatic self-righting and self-bailing lifeboat. 872.)
Brude lifeboat, Konrad Furubotn, Seattle, Wash. (1913.)
Burke, Wise & Co.'s lifeboat lowering and launching apparatus. (1878.)
Coston 28-foot collapsible lifeboat, approved as a lifeboat of class 2A, and allowed persons; Coston Supply Co., New York, N. Y. (1918.)
Dean & Co.'s improved diagonal lifeboat. (1883.)
Dickinson's self-righting lifeboat. (1881.)
Dobbin's lifeboat. (1885.)
Dobbin's metallic lifeboat. (1888.)
J. Walter Douglas lifeboat. (1893.)
Thomas Drein & Sons, Wilmington, Del., corrugated metallic lifeboat, when fitted ith suitable bottom boards of usual form to prevent the bulging of the floor plates y falling timbers. (1900.)
Eddy's patent sea lifeboat. (1883.)
Emergency Fleet Corporation's standard metallic lifeboats 16, 24, and 26 feet in ength, and equipments for same. (August, 1918.) Standard metallic lifeboats 20 nd 28 feet in length, and standard metallic motor lifeboat 26 feet in length. (October, 918.)
Engelhardt collapsible lifeboat, The Engelhardt Collapsible Lifeboat Co., Long sland City, N. Y. (1904.)
Konrad Furubotn, Seattle, Wash., Brude lifeboat. (1913.)
Gaskin reversible lifeboat, Wm. H. Appleton, New York, N. Y. (1918.) Rated s second class 2A, and life raft. (1919.)
Hercules patent noncanvas collapsible lifeboat, presented by James Howden & Co. Ltd.), New York, N. Y. (1918.)
Hills's nesting type of lifeboat, H. B. Hills, of Steward Davit, and Equipment Corpo- ation, New York, N. Y. Two 26-lifeboats of this type may be nested under a single et of davits. (1919.)
Holmes Motor Co. (Inc.), West Mystic, Conn., S. O. S. lifeboat. (1915.)
James Howden & Co. (Ltd.), New York, N. Y., Hercules patent noncanvas collapsi- le lifeboat. (1918.)
Hoy semidecked motor lifeboat, M. P. Hoy, Tacoma, Wash. (1916.)
O. R. Ingersoll, self-righting and self-bailing lifeboat. (1887.)
International Automatic Lifeboat Co., Chicago, Ill., and Portland, Me. Metallic feboat. (1911.)
George Judson's lifeboat. (1878.)
Lundin decked lifeboat, Welin Davit and Lane & De Groot Co., Long Island City, . Y. (1912.) See Rule III. (Improvements, subject to approval of supervising spector of district in which the boat is constructed.) (1915.)
Lundin housed lifeboat, Welin Marine Equipment Co., Long Island City, N. Y. 1914.) See Rule III.
Lundin open lifeboat with balsa-wood fenders, Welin Marine Equipment Co., Long sland City, N. Y. (1914.) See Rule III.
Lundin power lifeboat, Welin Marine Equipment Co., Long Island City, N. Y. 1914.) See Rule III.
Lundin semidecked lifeboat, Welin Marine Equipment Co., Long Island City, . Y. (1915.) See Rule III.
Lundin lifeboats of semidecked housed type, presented by Welin Marine Equip- ent Co., Long Island City, N. Y. (1918.)

Charles R. McCotter's lifeboat, Jacksonville, Fla. (1914.) See Rule III.
Mayer Lifeboat Co. (Inc.), Seattle, Wash. Dory lifeboat approved for vesse engaged exclusively in the business of hook-and-line fishing. (1923.)
Mayo Junior lifeboat, Robert D. Mayo, jr., Hopkins Station, Mich. (1904.)
Mayo Rescue lifeboat, R. D. Mayo, Muskegon, Mich. (1901.)
Loring W. Myer's lifeboat, Lubec, Me. (1905.)
A. D. Newcomb, Richmond, Va., inclosed lifeboat. (1917.)
F. L. Norton's lifeboat; boats to be built of yellow metal. (1887.)
W. J. Nunan's lifeboat, Buffalo, N. Y. (1897.)
Richardson's self-righting and self-bailing lifeboat. (1884.)
S. O. S. lifeboat, Holmes Motor Co. (Inc.), West Mystic, Conn. (1915.)
Gustav H. Schwab, New York, N. Y., Baswitz lifeboat. (1897.)
Shear's self-righting and self-bailing boat. (1873.)
Mr. Stoddars's self-righting and self-bailing lifeboat. (1872.)
William H. Taylor's lifeboat, Narragansett Pier, R. I. (1894.)
Welin Davit and Lane & De Groot Co. See Lundin lifeboats.
Welin Marine Equipment Co. See Lundin lifeboats.

## LIFEBOAT-DISENGAGING APPARATUS.

American Safety Navigation Co., Canton, Ohio. Lifeboat-releasing hook (1927.)
Harry A. Attfield, Berkeley, Calif., patent boat-releasing hook. (1917.)
Bouchard & Killian, Milwaukee, Wis., boat automatic-releasing device. (1909.)
Broady boat-releasing gear, presented by Welin Marine Equipment Co., Lon Island City, N. Y. (1918.)
Corser's one-man simultaneous releasing lifeboat hook, Pacific Boat & Iron Works Portland, Oreg. (1918.)
Coston boat-releasing gear, Coston Signal Co. (Inc.), New York, N. Y. (1911.)
Coston positive boat-releasing gear, presented by Coston Supply Co., New York N. Y. (1918.)
Coulter lifeboat-releasing hook, C. J. Coulter, Long Beach, Calif. (1919.)
Duinkers boat-releasing device, Royal Dutch West India Mail, New York, N. Y (1909.)
Eckliff Circulator Co., Detroit, Mich., J. H. Hook Model 1 boat-releasing appliance Name changed in 1918 from Jacques boat-releasing appliance, Damase Jacques Detroit, Mich. (1913.) Klippert lifeboat-disengaging apparatus. (1919.)
Joseph Forcier, Seattle, Wash. (1925.)
Gaertner boat-releasing hook, R. A. Gaertner, Seattle, Wash. (1911.)
Galbraith releasing gear, C. C. Galbraith & Sons, New York, N. Y. (1920.)
J. J. Haviside, jr., San Francisco, Calif. Boat-releasing hook. (1911.)
Hills boat-releasing gear, New York Shipbuilding Co., Camden, N. J. (1917. Name changed to Steward boat-releasing gear, manufactured by the Steward Davit & Equipment Corporation, Hudson, N. Y. (1918.) Steward lifeboat releasing gear Type AA, manufactured by Steward Davit & Equipment Corporation, Hudson, N. Y (1923.)
Hills releasing gear for open boats with collapsible sides and low freeboard, pre sented by the Steward Davit & Equipment Corporation, New York, N. Y. (1921.)
William J. Huff, Toronto, Canada. Boat-releasing hook. (1912.)
Hunt automatic boat-releasing device, Charles Hunt, New York, N. Y. (1909.)
Charles Hunt, New York, N. Y., Hunt automatic boat-releasing device. (1909. Boat-detaching apparatus. (1913.) Improvement in boat-detaching apparatus (1924, 1926.)
Interisland disengaging boat hook, presented by Capt. A. Tullett, Honolulu Hawaii; approved for use only in Hawaiian waters. (1909.)
Irwin lifeboat-disengaging hook, presented by Irwin Manufacturing Co., San Fran cisco, Calif. (1914.)
J. H. Hook Model 1 boat-releasing appliance, Eckliff Circulator Co., Detroit, Mich Name changed in 1918 from Jacques boat-releasing appliance, Damase Jacques Detroit, Mich.
Jacques boat-releasing appliance, Damase Jacques, Detroit, Mich. (1913.) Nam changed in 1918 to J. H. Hook Model 1 boat-releasing device, manufactured by Eck liff Circulator Co., Detroit, Mich.
Kinney Bros., Buffalo, N. Y., Young's lifeboat-releasing device. (1909.)
Klippert lifeboat-disengaging apparatus, Eckliff Circulator Co., Detroit, Mich (1919.)
C. M. Lane Lifeboat Co., Brooklyn, N. Y., Porter instantaneous engaging an disengaging device. (1917.)
A. Luckhurst, New York, N. Y., Murray boat-disengaging apparatus. (1909.

Capt. Allen Luckhurst, International Navigation Co., New York, N. Y., Semple & Ward boat-disengaging apparatus. (1907.)

Owen J. McGowan, president, Raymond Releasing Device (Inc.), New York, N. Y., the Yankee boat-disengaging apparatus. (1919.) Improved Raymond device. 1921.) Improved Yankee device. (1921.)

Manly lifeboat releasing device, Manly Lifeboat Releasing Device Co. (Inc.), Norfolk, Va. (1923.)

John A. McNabb, New York, N. Y., boat-releasing device. (1918.)

Mills patent boat-disengaging gear, presented by William Mills Co. (Ltd.), Sunderland, England. (1906.) New type, presented by American Balsa Co., Long Island City, N. Y. (1922.)

Monarch Valve Co., Brooklyn, N. Y., Windon boat-releasing gear. (1916.)

Murray boat-disengaging apparatus, A. Luckhurst, New York, N. Y. (1909.)

New England Navigation Co.'s standard boat-disengaging gear. (1906.)

New York Shipbuilding Co., Camden, N. J., Randle patent boat-disengaging apparatus. (1907.) Hills boat-releasing gear. (1917.)

Pacific Boat & Iron Works, Portland, Oreg., Corser's one-man simultaneous releasing lifeboat hook. (1918.)

Porter instantaneous engaging and disengaging device, C. M. Lane Lifeboat Co., Brooklyn, N. Y. (1917.)

Randle patent boat-disengaging apparatus, presented by the New York Shipbuilding Co., Camden, N. J. (1907.)

Raymond boat-releasing apparatus, presented by James R. Raymond, New York, N. Y. (1906.) Rule adopted August, 1918: On and after November 1, 1918, all Raymond lifeboat releasing hooks shall be arranged with a continuous fall so as to insure the coincident lowering of the forward and after ends of the boat, the releasing gear to be attached to the boat with fittings appropriate for the Raymond gear. This rule shall apply to Raymond hooks installed after August 12, 1918. Improved Raymond boat-releasing apparatus, presented by Owen J. McGowan, New York, N. Y. (1921.)

Henry E. Rottmer, Washington, D. C., boat-detaching device, approved only when installed with the lever fitted so as to be conveniently operated by the officer of the boat. (1906.)

Royal Dutch West India Mail, New York, N. Y., Duinkers boat-releasing device. (1909.)

Semple & Ward boat-disengaging apparatus, presented by Capt. Allen Luckhurst, International Navigation Co., New York, N. Y. (1907.)

Steward Davit and Equipment Corporation, Hudson, N. Y. Hills boat-releasing gear. (1917.) Hills releasing gear for open boats with collapsible sides and low freeboard. (1921.) Steward boat-releasing gear. (1918.) Steward lifeboat releasing gear, Type AA. (1923.)

Togersen releasing gear for double-bottom lifeboats, presented by B. E. Togersen, Seattle, Wash. (1921.)

Tregoning releasing gear, Tregoning Boat Co., Seattle, Wash. (1920.)

Capt. A. Tullett, Honolulu, Hawaii, Interisland disengaging boat hook, approved for use only in Hawaiian waters. (1909.)

Welin Marine Equipment Co., Long Island City, N. Y., Broady boat-releasing gear. (1918.)

Charles E. Wicks, Norfolk, Va., Boat-detaching hook. (1909.)

Windon boat-releasing gear, Monarch Valve Co., Brooklyn, N. Y. (1916.)

The Yankee boat-disengaging apparatus, Owen J. McGowan, president, Raymond Releasing Device, (Inc.), New York, N. Y. (1919.) Improvement. (1921.)

Young's lifeboat-releasing device, presented by Kinney Bros., Buffalo, N. Y. (1909.)

## LIFE RAFTS.

A B C life float (balsa wood), Welin Marine Equipment Co., Long Island City, N. Y. (1917.) See Rule III.

American Flexible Life Raft Co. (1877.)

Ammen metallic balsa or life raft. (1895.)

Anderson & Bailey, San Francisco, Calif. (1910.)

Angelus life raft, William Jacob, San Leandro, Calif. Equivalent to a pontoon life raft of the standard type. (1919.)

Wm. H. Appleton, New York, N. Y., Gaskin reversible life raft. (1918.) Gaskin reversible lifeboat rated as life raft. (1919.)

Beasley's life raft. (1881.)

M. A. Bryson's deer-hair life raft. (1877.)

Hon. H. C. Calkin's (New York) metallic raft. (1872.)

Cambridge life float, presented by The T. J. Flynn Metal Works (Inc.), Cam bridge, Mass. (1918.)
Carley life float, Carley Life Float Co., M. T. Whiton, president. (1901.) Se Rule III.
Chamber's life raft. (1888.)
Churchman & Groves, Philadelphia, Pa., Columbia life raft. (1886.)
Clark's life raft, care Detroit Shipbuilding Co., Detroit, Mich. (1873, 1910.)
Columbia life raft, Churchman & Groves, Philadelphia, Pa. (1886.)
J. A. Cone. (1875.) Drein & Son, Wilmington, Del. (1886.)
Court life float, types A and B, A. B. Court, naval constructor, U. S. N. (1918.)
Davis's life raft. (1877.)
Detroit Shipbuilding Co., Detroit, Mich., care of Clark life raft. (1873, 1910.)
Emergency Fleet Corporation's standard metallic pontoon life rafts, and equip ments for same, for 12, 17, and 24 persons. (August, 1918.)
The T. J. Flynn Metal Works (Inc.), Cambridge, Mass., Cambridge life float (1918.)
Frazee Lift Raft Co., New York, metallic raft. (1872.)
Gaskin reversible life raft, Wm. H. Appleton, New York, N. Y. (1918.)
Gaskin reversible lifeboat rated as life raft, William H. Appleton, New York N. Y. (1919.)
Griffith life raft. (1890.)
Emmett Harding's combined life raft and settee, when cylinders are constructed o metal. (1884.)
Herreshoff Manufacturing Co., Bristol, R. I., Sweeney life float. (1918.)
Edwin A. Hay's life raft. (1883.)
Hussey life raft. (1894.)
O. R. Ingersoll, New York, metallic raft. (1872.) Life raft, canvas cylinder covered with rattan, when provided with cross braces and air-tight valves for deter mining its air-tight condition. (1884.) Life raft composed of two cylinders made o cane and filled with block cork. (1887.)
William Jacob, San Leandro, Calif., Angelus life raft, equivalent to a pontoon life raft of the standard type. (1919.)
David Kahnweiler's metallic life raft, New York, N. Y. (1888.)
Lane & De Groot, Brooklyn, N. Y., metallic life raft. (1898.)
Le Duc Tule Improvement Co.'s life raft, San Francisco, Calif. (1886.)
McDonah life float, John H. McDonah, Boston, Mass. (1918.)
J. J. McLaughlin's life raft, Bombay, India. (1918.)
Matson life raft, H. J. Matson, Boston, Mass. (1909.)
Miller's life-saving raft. (1881.)
Moran Bros. Co., Seattle, Wash., metallic life raft. (1906.)
Ogden's life raft. (1874.)
W. S. Ray Manufacturing Co., San Francisco, Calif., metallic life raft. (1906.)
L. H. Raymond, the Reliance metallic life raft, New York, N. Y. (1896.)
Lewis H. Raymond's life raft. (1881.)
Reliance metallic life raft, L. H. Raymond, New York, N. Y. (1896.)
Rider's life raft. (1877.)
Robert Roberts's metallic raft. (1884.)
John T. Smith's metallic life raft, when the cylinders are provided with water-tigh bulkheads placed not over 2 feet apart. (1884.) Life raft, when constructed of gal vanized iron of not less than 24-wire gauge, Birmingham standard, in thickness (1885.)
Sweeney life float, presented by the Herreshoff Manufacturing Co., Bristol, R. I (1918.)
Torrey & Co. (1872.)
Twigg life raft, presented by John F. Twigg, San Francisco, Calif. Standard pon toon type of raft. (1919.)
F. H. Ward's metallic folding life raft. (1897.)
Woolsey's life buoy. Rated for two persons, for lake, bay, and river, when made as at present, of 52 pounds of cork, and in that proportion when containing a greate amount of cork. (1881–1883.)
Welin Davit and Lane & De Groot Co., New York, N. Y. Metallic life raft. (1911.)
Welin Marine Equipment Co., Long Island City, N. Y., A B C life float. (1917. See Rule III.

## LIFE PRESERVERS.

A B C balsa-wood life jacket, with ilanasilk collar, for adult and for child, Edmonds's (1919.) See Robinson & Roders Co.
A B C life belt (balsa wood), presented by the Lane & De Groot Co., New York N. Y. (1909.)

A B C life preserver (balsa wood), presented by the Welin Davit and Lane & De Groot Co., Long Island City, N. Y. (1912.)

Armstrong Bros. & Co., Pittsburgh, Pa., compressed granulated cork life preserver. (1885.)

Armstrong Cork Co., Pittsburgh, Pa., child's cork life preserver. (1916.)

Cork block body with kapok collar. (1919.)

Atlantic-Pacific Manufacturing Co., Brooklyn, N. Y., cork block body with kapok collar. Kapok body with kapok collar. (1919.)

Atlantic-Pacific Manufacturing Corporation, Brooklyn, N. Y. No. 3 cork-block life preserver. (1922.)

Miss Anna Deane Bailey, New York, N. Y.; improved life preserver No. 1, of the jacket and collar type, filled with 28 ounces of prime Java kapok; two types of the Bailey adjustable and reversible kapok life preservers for adults and children, one with brass grommets, and one with eyelets for strap leaders. (1918.)

Bailey life preservers. See G. H. Masten Co. (Inc.).

Betsy Ross Flag Co. (Inc.), Newburgh, N. Y. For use on river steamers. (1925.)

Boddy No. 4 life-saving jacket (kapok), presented by Boddy Life-Saving Appliances (1914) (Ltd.), London, England. (1918.)

Justus Brauer & Son Co., Camden, N. J. (1924.)

H. Brunswig, life-saving buoy, Hoboken, N. J. (1898.)

Bryson's deer-hair life preserver. (1877.)

Butz block-cork life preserver, A. L. Butz Cork Co., Philadelphia, Pa. (1905.)

E. Clark, cork life preserver. (1872.)

George Clark, jr., life preserver. (1878.)

Eliza R. Cogswell, life preserver invented by. (1883.)

Compressed Cork Co., Ossining, N. Y., adult cork body with kapok collar. (1920.) Also manufactured by L. Mundet & Son, Brooklyn, N. Y. (1922.) Child's life preserver, cork body and kapok collar. (1921.)

Coston improved life belt (combination cork and kapok), presented by Coston Supply Co., New York, N. Y. (1918.)

Clara V. Czepull, Lancaster, Pa., block-cork life preserver. (1915.)

Dreadnaught life preserver made of prime Java kapok. (1919.) Modified Dreadnaught life preserver made of kapok. (1920.) Safety-At-Sea Corporation, New York, N. Y.

James S. Dunant's California tule life preserver. (1884.)

Edmonds's life preservers. See Robinson & Roders Co.

Everfloat Life Preserver Co., New York, N. Y., Sanitary Java kapok life preserver. (1918.)

Fedco Marine Appliance Corporation, Jersey City, N. J. Kapok life preserver of the jacket type, with collar. (1922.)

Foster life preservers. Type A for ocean and coastwise vessels. Types B and C for lake, bay, sound, and river vessels. Presented by The Foster Manufacturing Co., New Orleans, La. (1921.)

C. C. Galbraith & Son (Inc.), New York, N. Y., cork block body with kapok collar. (1919.) Child's life preserver, cork body and kapok collar. (1920.)

Charles Garrison, Boston, Mass., Kapo Neversink life preserver. (1917.)

Godfrey & Boyce's life preserver. (1875.)

W. K. Greenebaum, Chicago, Ill., block-cork life preserver, adjustable, for adult or child. (1916.)

J. B. Hamilton's life preserver, Springfield, Mass. (1901.)

Haviside, Withers & Davis, San Francisco, Calif., International tule life preserver, one kind for adults and one kind for children. (1917.)

George W. Hendry, San Francisco, Calif., tule life preserver, adjustable, for adult or child. (1916.)

Dr. Charles Hunt's life preserver, New York, N. Y. (1907.)

O. R. Ingersoll, cork life preserver. (1872.)

International tule life preserver, one kind for adults and one kind for children, presented by Haviside, Withers & Davis, San Francisco, Calif. (1917.)

Kahnweiler's never-sink life preserver. (1874.)

D. Kahnweiler & Son's pressed-cork life preserver. (1894.)

David Kahnweiler's Sons, New York, N. Y. Kahnweiler's never-sink cork life jacket with kapok collar. Cork block body with kapok collar. (1919.) Child's life preserver, cork body and kapok collar. (1920.) Eight-pocket type cork-block life preserver. (1922.) Name changed to Kahnweiler Marine Equipment Co. (1924.)

Kapo Manufacturing Co., Boston, Mass., life jacket and commercial life preserver, kapok. (1918.) Kapok body with kapok collar. (1919.)

Kapo Neversink life preserver, Charles Garrison, Boston, Mass. (1917.)

Knickerbocker Supply Co., New York, N. Y., kapok jacket life preserver. (1918.)

Lancaster Cork Works, Lancaster, Pa. (1922.) Eight-block jacket type. (1923.)
Lane & De Groot Co., New York, N. Y., A B C life belt (balsa wood). (1909.)
C. M. Lane, of the Lane & De Groot Co., Long Island City, N. Y., the ravenswood life preserver. (1904.)
Le Duc Tule Improvement Co.'s life preserver. (1886.)
Joseph K. McCammon, the Le Duc. (1887.)
G. H. Masten Co. (Inc.)., New York, N. Y., kapok life-preserver jacket. (1918.) Bailey cork life-preserver jacket with kapok collar, Bailey kapok life-preserver jacket with combination kapok collar and hood, cork block body with kapok collar, kapok body with kapok collar, Masten's cork life preserver, Masten's kapok life preserver. (1919.) Masten's child's life preserver with cork body and kapok collar, and Masten's child's life preserver with kapok body and kapok collar. (1920.)
Morrison Life Belt Co., St. Louis, Mo., cork life preserver. (1904.)
L. Mundet & Son, Brooklyn, N. Y., cork block body with kapok collar, kapok body with kapok collar. (1919.) Also manufactures adult life preserver with cork body and kapok collar approved for Compressed Cork Co., Ossining, N. Y. (1922.)
L. Mundet & Son (Inc.), Brooklyn, N. Y. Eight-block jacket type. (1923.)
National Cork Co., life preserver, Brooklyn, N. Y. (1904.)
Ravenswood life preserver, C. M. Lane, of the Lane & De Groot Co., Long Island City, N. Y. (1904.)
Fitch Reynolds's cork life preserver. (1879.)
Robinson & Roders Co., Newark, N. J., Universal ilanasilk ship life preserver, adjustable for adult or child. (1916; modified, 1918.) Universal ilanasilk pillow life preserver, adjustable, for adult or child. (1916.) Universal ilanasilk patrol life preserver. (June, 1916; modified, 1918.) Universal ilanasilk jacket life preserver. (1917, 1918; modified and approved for adults and children, 1918.) Edmonds's A B C balsa-wood life jacket, with ilanasilk collar, for adult and for child; Edmonds's cork life jacket with ilanasilk collar; Edmonds's life jacket with kapok body and kapok collar for adult, same for child; Edmonds's life jacket with balsa wood body and kapok collar for adults, same for child. (1919.)
Safety-At-Sea Corporation, New York, N. Y. Dreadnaught life preserver made of prime Java kapok. (1919.) Modified dreadnaught life preserver made of kapok. (1920.)
Sanitary Java kapok life-preserver vest, presented by the Everfloat Life Preserver Co., New York, N. Y. (1918.)
M. A. Scott, cork life preserver. (1872.)
J. A. Seamans, cork life preserver. (1872.)
John T. Smith, New York, N. Y. The Edward Maynard life preserver. (1887.) Life preserver. (1892.)
Universal life preservers. *See* Robinson & Roders Co.
United Indurated Fibre Co., Lockport, N. Y. (1908.)
Upson-Walton Co., solid-cork life preservers, Cleveland, Ohio. (1905.)
Welin Davit and Lane & De Groot Co., Long Island City, N. Y., A B C life preserver (balsa wood.) (1912.)
White & Hay's cork life jacket. (1878.)

## LIFE BUOYS.

A B C ring life buoy (balsa wood), presented by Welin Marine Equipment Co., Long Island City, N. Y. (1916.) See Rule III.
George Bernard Dame, Brooklyn, N. Y., Indestructible ring life buoys (cork), types A and B. (1918.)
Indestructible ring life buoys (cork), types A and B, presented by George Bernard Dame, Brooklyn, N. Y. (1918.)
Robinson-Roders Co., Newark, N. J., Universal ilanasilk ring life buoy. (1917.)
Universal ilanasilk ring life buoy, presented by Robinson-Roders Co., Newark, N. J. (1917.)
Welin Davit and Boat Corporation, Long Island City, N. Y., ring life buoy made of balsa wood. (1924.)
Welin Marine Equipment Co., Long Island City, N. Y., A B C ring life buoy. (1916.) See Rule III.

## LINE-CARRYING GUNS AND PROJECTILES.

American and British Manufacturing Co., Bridgeport, Conn.
Bridger shoulder gun, the Naval Co., Roslyn, Pa. (1924.)
Coston line-carrying gun, Coston Signal Co., New York, N. Y. (1913.)

Coston Signal Co., New York, N. Y., Coston line-carrying gun. (1913.)
Coston Supply Co., New York, N. Y. Shoulder gun. (1919.)
Driggs Ordnance Co. (Inc.), New York, N. Y. Sayres line-carrying gun. (1919.)
C. D. Durkee & Co., New York, N. Y. (1919.)
C. C. Galbraith & Son, New York, N. Y. (1919.)
The General Ordnance Co., Groton, Conn. (1919.)
E. George & Co. (Inc.), New York, N. Y. (1919.)
Hall line-carrying gun, presented by The Naval Co., Philadelphia, Pa. (1919.)
Model F, two types. (1920.)
Hunt's line-carrying gun, large. (1890.)
Hunt's line-carrying gun, small. May be used on all vessels from 100 to 500 tons. (1890.)
Hunt gun, No. 2, 20 inches long, 2½ inches diameter of bore. May be used on steam vessels from 100 to 500 tons when the gun is constructed in all its parts of material same as used in the large Hunt gun already approved by this board. (1893.)
International line-carrying gun No. 3, George Murch, New York, N. Y. (1909.)
David Kahnweiler's Sons, New York, N. Y. (1915.)
Knickerbocker Supply Co., New York, N. Y. (1919.)
Lyle life-saving shoulder gun may be used on all vessels not exceeding 300 gross tons. (1906.)
Lyle line-carrying gun. (1890.)
McNab Co., Bridgeport, Conn. (1919.)
Marine Manufacturing & Supply Co., New York, N. Y. (1919.)
George Murch, New York, N. Y., International line-carrying gun No. 3. (1909.)
Meyer & Rogers, Seattle, Wash., gun and self-anchoring projectile carrying a life line. (1907.)
Meyer-Rogers line-carrying gun No. 2, Meyer-Rogers Projectile Co., New York, N. Y. (1909.)
Meyer-Rogers Projectile Co., New York, N. Y., Meyer-Rogers line-carrying gun No. 2. (1909.) Equipment for Meyer-Rogers line-carrying guns Nos. 1 and 2. (1909.)
The Naval Co., Philadelphia, Pa., Hall line-carrying gun, types A and B. (1919.)
Model F, two types. (1920.)
The Naval Co., Roslyn, Pa., Bridger shoulder gun. (1924.)
R. S. Newbold & Sons Co., Norristown, Pa. (1919.)
Wm. Read & Sons (Inc.), Boston, Mass. Shoulder gun. (1919.)
Sayres line-carrying gun, Driggs Ordnance Co. (Inc.), New York, N. Y. (1919.)
Sample line shot tracer, presented by John B. Semple, Pittsburgh, Pa. (1907.)
A. P. Smith Manufacturing Co., East Orange, N. J. (1919.)
Steward Davit & Equipment Corporation, New York, N. Y. Two types. (1919.)
The Tozzi Manufacturing Co., New York, N. Y. (1919.)
United States Life-Saving Equipment Co., Boston, Mass. Illuminated double line-carrying shot. (1911.)
The James Walker Co., Baltimore, Md. (1919.)

## LOW-WATER INDICATORS.

Ohio low-water alarm, the Ohio Injector Co., Chicago, Ill. (1928.)

## FIRE EXTINGUISHERS.

### LIQUID CHEMICAL FIRE EXTINGUISHERS APPROVED FOR USE ON VESSELS ON AND AFTER JANUARY 1, 1920.

Aaron, Robinson Fire Apparatus Manufacturing Co., or Stempel Fire Extinguisher Manufacturing Co., St. Louis, Mo.
Accurate, National Metal Stamping Manufacturing Co., Newark, N. J.
Accurate pump tank; formerly Guardene pump tank, which see.
Ajax No. 1, Ajax Fire Engine Works, Brooklyn, N. Y.
Ajax No. 3 (1 quart, carbon tetrachloride), Ajax Fire Engine Works, Brooklyn, N. Y.
Alaskan (calcium chloride solution. Use of Alaskan charges required), The General Manufacturing Co., St. Louis, Mo.
Alenco, W. D. Allen Manufacturing Co., Chicago, Ill.
Alert, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Apex, Minimax Co., New York, N. Y.

[1] Formerly American-La France Fire Engine Co.

Arrow, M. L. Snyder & Son, Philadelphia, Pa.
Atlas, Northern Fire Apparatus Co., Minneapolis, Minn.
Automatic, Geo. W. Diener Manufacturing Co., Chicago, Ill.
Badger's, Badger Fire Extinguisher Co., Boston, Mass.
Badger's No. 1 (1 quart, carbon tetrachloride), Badger Fire Extinguisher Co., Boston, Mass.
Badger's Pony, Badger Fire Extinguisher Co., Boston, Mass.
Bear, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Bear (1 and 1½ quarts, carbon tetrachloride), The American Rubber Manufacturing Co., San Francisco and Los Angeles, Calif.
Boyce Fire Syphon, Model B (1 and 1½ quarts, carbon tetrachloride), Boyce & Veeder Co. (Inc.); factory, Dayton, Ohio; general office, Long Island City, N. Y.
Buffalo, Buffalo Fire Appliance Corporation, Buffalo, N. Y.
Buffalo No. 2 (1 quart, carbon tetrachloride), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Buffalo No. 3 (1 quart, carbon tetrachloride), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Buffalo No. 4 (1½ quarts, carbon tetrachloride), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Buscoba, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Cascade, Seattle Hardware Co., Seattle, Wash.
Castle Fire Guard, James M. Castle (Inc.), Philadelphia, Pa.
Castle Fyr Guard, James M. Castle (Inc.), Philadelphia, Pa.
Chief Croker, Croker National Fire Prevention Engineering Co., New York, N. Y.
Childs, American-La France & Foamite Corporation, Elmira, N. Y.[2 3]
Childs's Model A (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[2]
Childs's Model B (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[2]
Columbia, Columbia Fire Extinguisher Co., New York, N. Y.
Crescent, John Simmons Co., New York, N. Y.
CT (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[4]
Defender, Schwartz Bros., Philadelphia, Pa.
Deluge, Fabric Fire Hose Co., New York, N. Y.
Eastman, Western Inspection Co., Buffalo, N. Y.
Ecnarusni, Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Edwards, H. D. Edwards & Co., Detroit, Mich.
Elkhart, Elkhart Brass Manufacturing Co., Elkhart, Ind.
F. F., Fyr-Fyter Co., Dayton, Ohio.
Fairbanks, The Fairbanks Co., New York, N. Y.
Fairmorse, The Canadian Fairbanks-Morse Co. (Ltd.), Montreal, Canada.
Fire Gun No. 0 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]
Fire Gun No. 1 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]
Fire Gun No. 2 (1½ quarts, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]
Fire Gun, Type B, American-La France & Foamite Corporation, Elmira, N. Y.[5]
Firefly (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[4]
Foamite fire-extinguishing systems may be of a type employing either two-solution tanks or a generator using an approved dry chemical mixture; American-La France & Foamite Corporation, Elmira, N. Y.
Foamite, Type CA (2½ gallons, foam type) American-La France & Foamite Corporation, Elmira, N. Y.[3]
Foamite Type U. S. No. 2½ (2½ gallons, foam type) American-La France & Foamite Corporation, Elmira, N. Y.[3 4]
Foamite Type U. S. No. 5 (4 gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[3 4]
Fyr-Fyter, Super Model (1 and 1½ quarts, carbon tetrachloride), The Fyr Fyter Co., Dayton, Ohio.

[1] Formerly American-La France Fire Engine Co.
[2] Formerly O. J. Childs Co.
[3] Formerly Foamite Childs Corporation.
[4] Formerly Foamite Firefoam Co.
[5] Formerly Fire Gun Manufacturing Co. (Inc.).

Gold Seal, Goodyear Rubber Co., San Francisco, Calif, and Portland, Oreg.
Grinnell, Grinnell Co. (Inc.), Providence, R. I., and Grinnell Co. of the Pacific, San Francisco, Calif.
Guardene, Pyrene Manufacturing Co., New York, N. Y.
Guardene pump tank, 5 gallons' capacity, accepted in lieu of the 2½-gallon fire extinguisher, Pyrene Manufacturing Co., New York, N. Y. Name changed to Accurate pump tank.
Hale, American-La France & Foamite Corporation, Elmira, N. Y.[1], and George C. Hale, Kansas City, Mo.
Hayward, American-La France & Foamite Corporation, Elmira, N. Y.[6]
Hickory, Kelley-How-Thomson Co., Duluth, Minn.
J-M (1 quart, carbon tetrachloride), H. W. Johns-Manville Co., New York, N. Y.
Jennison, The Jennison Hardware Co., Bay City, Mich.
Josico, John Simmons Co., New York, N. Y.
Kar-bo-lene (2 quarts, carbon tetrachloride), Knight & Thomas (Inc.), Boston, Mass.
Keystone, James Boyd & Bro. (Inc.), and National Fire Protection Co., Philadelphia, Pa.
Kilflame, Superior Products Co., Dallas, Tex.
La France (two makes of 1 quart and one of 1½ quarts, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]
La France Foam Type (2½ gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[1]
La France No. 3 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]
La France No. 4 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]
La France No. 5 (1½ quarts, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]
La Prudencia, American-La France & Foamite Corporation, Elmira, N. Y.[6]
Louisville, American-La France & Foamite Corporation, Elmira, N. Y.[1]; H. W. Neill Co. and Neill-La Vielle Supply Co., Louisville, Ky.
Magician, Washington Rubber Co., Washington, D. C.
Marswell, Marshall-Wells Co., Duluth, Minn.
Marvel, Howard-Cooper Corporation, Portland, Oreg.; Seattle, Spokane, Boise.
McGowin-Lyons, McGowin-Lyons Hardware & Supply Co., Mobile, Ala.
Memphi, Riechman-Crosby Co., Memphis, Tenn.
Metropolitan, Metropolitan Fire Extinguisher Co., New York, N. Y.
Metropolitan No. 2, Metropolitan Fire Extinguisher Co., New York, N. Y.
Miller Peerless (1 and 1½ quarts, carbon tetrachloride), Miller Peerless Mfg. Co., Chicago, Ill.
Type S Copper Minimax, 1½ and 2½ gallons, Minimax Co., New York, N. Y.
Niagara (1 and 1½ quarts, carbon tetrachloride), The Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Non-Slop Guardene, Pyrene Manufacturing Co., New York, N. Y.
One Quart (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]
Pacific, Pacific Mill & Mine Supply Co., San Francisco and Los Angeles, Calif.
Paragon, James Boyd & Bro. (Inc.), and National Fire Protection Co., Philadelphia, Pa.
Patrol, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Peerless, American-La France & Foamite Corporation, Elmira, N. Y.[1]; and Geo. B. Carpenter & Co., Chicago, Ill.
Phister (1 gallon, carbon tetrachloride), The Phister Manufacturing Co., Cincinnati, Ohio. Rated for 2 extinguishers where 4 or more are required in table in Rule IV, for fire extinguishers required for automobiles and motor vehicles carried.
Phomene (2½ gallons, foam type), Pyrene Manufacturing Co., Newark, N. J.
Presto (1 quart, carbon tetrachloride), Knight & Thomas (Inc.), Boston, Mass.
Preventor, Prevention Service, New York, N. Y.
Protector No. 10 (40 gallons' capacity), Knight & Thomas, Boston, Mass.
Protex Anti-Freezing, Knight & Thomas, Inc., Boston, Mass.
Pyrene (1 and 1½ quarts carbon tetrachloride), Pyrene Manufacturing Co., New York, N. Y.
Quality, Barber & Ross, Washington, D. C.

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[1] Formerly American-La France Fire Engine Co.
[6] Formerly S. F. Hayward & Co.

Queen, Harker Manufacturing Co., Cincinnati, Ohio.
Queen No. 2 (1 quart, carbon tetrachloride), Harker Manufacturing Co., Cincinnati, Ohio
Quick Service, Vapo Foam Manufacturing Co., Chicago, Ill.
Railway and Marine, Knight & Thomas (Inc.), Boston, Mass.
Red Chief, Akers & Co., Memphis, Tenn.
Red Top, The General Manufacturing Co., St. Louis, Mo.
Reliable, Thomas J. Sheehan Co., St. Louis, Mo.
Reliance, W. S. Nott Co., Minneapolis, Minn.
Rescue, American-La France & Foamite Corporation, Elmira, N. Y.[6]
Rough Rider, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Safety, The Safety Fire Extinguisher Co., New York, N. Y.
Salvage, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Security (1¼ gallons), A. C. Rowe & Son New York, N. Y.
Security (1 quart, carbon tetrachloride), A. C. Rowe & Son, New York, N. Y.
Security No. B, A. C. Rowe & Son, New York, N. Y.
Sentry, The Seagrave Co., Columbus, Ohio.
Sieben chemical nozzle, Sieben Chemical Co., Kansas City, Mo.
Standard, Miller Chemical Engine Co., Chicago, Ill.
The Stempel (1 and 1½ quarts, carbon tetrachloride), The Stempel Fire Extinguisher Mfg. Co., St. Louis, Mo.
Success, H. W. Johns-Manville Co., New York, Milwaukee.
Turner, American-La France & Foamite Corporation, Elmira, N. Y.[1]
Underwriters New No. A1, Knight & Thomas (Inc.), Boston, Mass.
Underwriters (1¼ gallons), Knight & Thomas (Inc),. Boston, Mass.
Underwriters, Type A, Knight & Thomas (Inc.), Boston, Mass.
Underwriters, Type B1, Knight & Thomas (Inc.), Boston, Mass.
Underwriters, New Type, Knight & Thomas (Inc.), Boston, Mass.
Underwriters, Nonslop Type, Knight & Thomas (Inc.), Boston, Mass.
Universal, American Fire Equipment Co., Boston, Mass.
Vulcan, Knight & Thomas (Inc.), Boston, Mass.
Weldon Fireout (1 quart, carbon tetrachloride), Weldon Manufacturing Co., Grand Rapids, Mich.
Woodhouse, The Woodhouse Mfg. Co., New York, N. Y.
Woodwico, Woodward, Wight & Co. (Ltd.), New Orleans, La.

APPROVED CARBON TETRACHLORIDE AND FOAM TYPE FIRE EXTINGUISHERS WHICH HAVE DEMONSTRATED A CAPACITY FOR EXTINGUISHING BURNING OILS, BURNING GASOLINE, AND OTHER BURNING PRODUCTS OF PETROLEUM, REQUIRED TO BE CARRIED ON VESSELS CARRYING PASSENGERS WHICH TRANSPORT AUTOMOBILES OR MOTOR VEHICLES THE MOTIVE POWER OF WHICH IS GENERATED BY ANY OF THE PRODUCTS OF PETROLEUM, OR OTHER INFLAMMABLE LIQUIDS, UNDER THE PROVISIONS OF RULE IV RELATING TO FIRE EXTINGUISHERS.

Ajax No. 3 (1 quart), Ajax Fire Engine Works, Brooklyn, N. Y.
Badger's No. 1 (1 quart), Badger Fire Extinguisher Co., Boston, Mass.
Bear (1 and 1½ quarts), The American Rubber Manufacturing Co., San Francisco and Los Angeles, Calif.
Boyce Fire Syphon, Model B (1 and 1½ quarts), Boyce & Veeder Co. (Inc.), factory, Dayton, Ohio; general office, Long Island City, N. Y.
Buffalo No. 2 (1 quart), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Buffalo No. 3 (1 quart), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Buffalo No. 4 (1½ quarts), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.
Childs's Model A (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[2]
Childs's Model B (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[2]
CT (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[4]
Fire Gun No. 0 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]
Fire Gun No. 1 (1 quart), American-La France & Foamite Corporation Elmira, N. Y.[3 5]
Fire Gun No. 2 (1½ quarts), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]

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[1] Formerly American-La France Fire Engine Co.
[2] Formerly O. J. Childs Co.
[3] Formerly Foamite Childs Corporation.
[4] Formerly Foamite Firefoam Co.
[5] Formerly Fire Gun Manufacturing Co. (Inc.).
[6] Formerly S. F. Hayward Co.

Firefly (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[4]

Foamite foam generator using an approved dry chemical mixture, portable type, with not over 150 feet of 2½-inch discharge hose and 1¾-inch nozzle; American-La France & Foamite Corporation, Elmira, N. Y.

Foamite, Type CA (2½ gallons, foam type) American-La France & Foamite Corporation, Elmira, N. Y.[3]

Foamite Type U. S. No. 2½ (2½ gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[3 4]

Foamite Type U. S. No. 5 (4 gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[3 4]

Fomon continuous foam generator using an approved dry chemical mixture, portable type, with not over 150 feet of 2½-inch discharge hose and 1¾-inch nozzle; American Fomon Co. (Inc.), Philadelphia, Pa.

Fyr-Fyter, Super Model (1 and 1½ quarts), The Fyr-Fyter Co., Dayton, Ohio.

J-M (1 quart), H. W. Johns-Manville Co., New York, N. Y.

Kar-bo-lene (2 quarts), Knight & Thomas (Inc.), Boston, Mass.

La France (two makes of 1 quart and one of 1½ quarts), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France Foam Type (2½ gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 3 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 4 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 5 (1½ quarts), American-La France & Foamite Corporation, Elmira, N. Y.[1]

Miller Peerless (1 and 1½ quarts), Miller Peerless Mfg. Co., Chicago, Ill.

Niagara (1 and 1½ quarts), The Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

One Quart (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[1]

Phister (1 gallon), The Phister Manufacturing Co., Cincinnati, Ohio. Rated for 2 extinguishers where 4 or more are required in table in Rule IV, for fire extinguishers required for automobiles and motor vehicles carried.

Phomene (2½ gallons, foam type), Pyrene Manufacturing Co., Newark, N. J.

Presto (1 quart), Knight & Thomas (Inc.), Boston, Mass.

Pyrene (1 and 1½ quarts), Pyrene Manufacturing Co., New York, N. Y.

Queen No. 2 (1 quart), Harker Manufacturing Co., Cincinnati, Ohio.

Security (1 quart), A. C. Rowe & Son, New York, N. Y.

The Stempel (1 and 1½ quarts), The Stempel Fire Extinguisher Mfg. Co., St. Louis, Mo.

Weldon Fireout (1 quart), Weldon Manufacturing Co., Grand Rapids, Mich.

## TANKS.

No. 1 American fire-bucket tank, 15 by 27½ inches (inside measurements), when containing 21 gallons of nonfreezing chemical liquid, and fitted with six 10-quart buckets, shall be allowed in lieu of 8 fire buckets. A. C. Rowe & Son, New York, N. Y.

No. 2 American fire-bucket tank, 18 by 28½ inches (inside measurements), when containing 31 gallons of nonfreezing chemical liquid, and fitted with six 14-quart buckets, shall be allowed in lieu of 11 buckets or 1 barrel and 1 fire bucket. A. C. Rowe & Son, New York, N. Y.

New size No. 2 American fire-bucket tank, 18 by 30½ inches (inside measurements), when containing 33 gallons of nonfreezing chemical liquid, and fitted with seven 13½-quart buckets, shall be allowed in lieu of 12 buckets or 1 barrel and 2 fire buckets. A. C. Rowe & Son, New York, N. Y.

No. 1 Emergency bucket tank, 15 by 31½ inches (inside measurements), when containing 25 gallons of nonfreezing chemical liquid, and fitted with six 10-quart buckets, shall be allowed in lieu of 8 fire buckets. National Enameling & Stamping Co. (Inc.), New York, N. Y.

No. 2 Emergency bucket tank, 19¾ by 33¾ inches (inside measurements), when containing 40 gallons of nonfreezing chemical liquid and fitted with six 14-quart

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[1] Formerly American-La France Fire Engine Co.
[3] Formerly Foamite Childs Corporation.
[4] Formerly Foamite Firefoam Co.

buckets, shall be allowed in lieu of 14 buckets or 1 barrel and 4 buckets. National Enamel & Stamping Co. (Inc.), New York, N. Y.

Little Giant portable hand-pump tank, allowed in lieu of the 2½-gallon fire extinguisher when having a capacity of 5 gallons. Little Giant Manufacturing Co., New York, N. Y.

No. 1 Safety fire-bucket tank, 15 by 28 inches (inside measurements), when containing 21 gallons of nonfreezing chemical liquid, and fitted with six 10-quart buckets, shall be allowed in lieu of 8 fire buckets. The Safety Fire Extinguisher Co., New York, N. Y.

No. 2 Safety fire-bucket tank, 18 by 30 inches (inside measurements), when containing 33 gallons of nonfreezing chemical liquid, and fitted with six 14-quart buckets, shall be allowed in lieu of 12 buckets or 1 barrel and 2 fire buckets. The Safety Fire Extinguisher Co., New York, N. Y.

No. 3 Safety fire-bucket tank, 18 by 35 inches (inside measurements), when containing 38 gallons of nonfreezing chemical liquid, and fitted with six 14-quart buckets, shall be allowed in lieu of 14 buckets or 1 barrel and 4 fire buckets. The Safety Fire Extinguisher Co., New York, N. Y.

### BUCKETS.

Foamite fire pail, 3 gallons' capacity, foam type, rated as a regular fire bucket; American-La France & Foamite Corporation, Elmira, N. Y.[3] [4]

McLaughlin chemical fire pail, hermetically sealed, 3 gallons' capacity, rated as a regular fire bucket; Daniel B. McLaughlin, Philadelphia, Pa.

Waggoner Sanatory fire bucket, presented by the Geo. W. Diener Manufacturing Co., Chicago, Ill. This bucket has a capacity of 3.3 gallons, is provided with a cover, and contains a water solution of calcium chloride. It is rated as one regular fire bucket.

## APPARATUS FOR EXTINGUISHMENT OF FIRE IN COMPARTMENTS OF STEAMERS.

Amdyco fire foam system. Bethlehem Shipbuilding Corporation (Ltd.), Bethlehem, Pa.

Clayton fire-extinguishing system. Clayton Fire Extinguishing Co., New York, N. Y.

Foamite fire-extinguishing systems may be of a type employing either 2-solution tanks or a generator using an approved dry chemical mixture. American-La France & Foamite Corporation, Elmira, N. Y.[3] [4] (See Rule IV.)

Fomon continuous foam generator using an approved dry chemical mixture, portable type, with not over 150 feet of 2½-inch discharge hose and 1¾-inch nozzle. American Fomon Co. (Inc.), Philadelphia, Pa.

Grimm fire-extinguishing system. The Sulphur Dioxide Co., New York, N. Y.

Harker fire-extinguishing system. The Harker Fire Extinguisher & Fumigator Co. (Ltd.), Sydney, New South Wales.

Lux system. Walter Kidde & Co. (Inc.), New York, N. Y. Cylinders containing the carbon dioxide should be weighed at least once each year.

### STEAM PUMPS.

Coll's single-suction steam siphon, presented by Mr. Coll, Pittsburgh, Pa. (1872).

Coll's improved steam siphon pump. (1874).

Hall's duplex steam pump. (1889.)

Landsell's double-suction steam siphon, presented by H. S. Landsell, New York. (1872.)

A. Slouthouer, New Philadelphia, Ohio, fire and bilge pump. (1872).

Sheriff's steam siphon pump. (1875.)

Van Duzen & Tift's steam jet pump, for use as a steam fire pump on steamers of 100 tons and under. (1884.)

### SAFETY VALVES.

Common lever valve. (1884.)

H. G. Ashton, East Cambridge, Mass. (1872.)

Ashcroft's safety valve. (1877.)

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[3] Formerly Foamite Childs Corporation.

[4] Formerly Foamite Firefoam Co.

American Steam Gauge Co., Boston, Mass.; American Schaeffer & Budenberg Corporation, Brooklyn, N. Y., and Worcester, Mass.; American spring safety valve. (1885.)

Adams spring safety valve, manufactured by Thomas Adams & Co., Manchester, England; presented by Luther D. Lovekin, Camden, N. J. (1903.)

Case & Bailey, Detroit, Mich. (1872.)

Coale side outlet safety valve, presented by Coale Muffler & Safety Valve Co., Baltimore, Md. (1917.)

J. M. Coale's pop safety valve and muffler. (1894.)

Cockburn's safety valve. (1877.)

George E. Collyer, safety valve. (1883.)

Consolidated Safety Valve Co., New York, N. Y.; pop safety valves, Richardson & Co., Troy, N. Y. (1872.) Forms D. I. and D. S. (1924.)

Consolidated Safety Valve Works, Manning, Maxwell & Moore (Inc.), Bridgeport, Conn. Form H, type FH, portable top outlet safety valve. (1927.)

Crane pop safety valve, presented by the Crane Co. (1895; improvement, 1915.)

Crosby's safety valve. (1877.)

Crosby high-efficiency pop safety valve, presented by Crosby Steam Gage & Valve Co., Boston, Mass. (1917.)

Crosby's safety valves, types HR, HN, and HO, presented by the Crosby Steam Gage & Valve Co., Boston, Mass. (1928.)

Crosby & Meady, pop safety valve. (1888.)

Dry Dock Engine Works, Detroit, Mich. (1873.)

Spring-loaded safety valve, presented by James W. Elwell & Co., New York, N. Y., manufactured by Lethuillier & Pinel, Rouen, France. (1904.)

Hall's incased safety valve, when lever is permanently attached to valve casing. (1889.)

The N. L. Hayden Manufacturing Co., Columbus, Ohio, Hercules spring-loaded safety valve. (1904.)

Norman L. Hayden, Columbus, Ohio, Tippet spring safety valve. (1903.)

Hercules spring-loaded safety valve, The N. L. Hayden Manufacturing Co., Columbus, Ohio. (1904.)

Herreshoff Manufacturing Co., pop safety valve. (1883).

Hodgin's safety valve. (1877.)

I. T. Kearns, pop safety valve. (1893.)

Kunkle Valve Co., Fort Wayne, Ind., spring-loaded safety valve. (1886.)

Lethuillier & Pinel, Rouen, France, manufacturers of spring-loaded safety valve presented by James W. Elwell & Co., New York, N. Y. (1904.)

J. E. Lonergan Co., Philadelphia, Pa., Lynde safety valve. (1910.)

Luther D. Lovekin, Camden, N. J., presented Adams spring safety valve, manufactured by Thomas Adams & Co., Manchester, England. (1903.)

F. Lunkenheimer, safety valve. (1888.)

The Lunkenheimer improved pop safety valve. (1896.)

J. D. Lynde, Philadelphia, Pa. (1872.)

Lynde safety valve, J. E. Lonergan Co., Philadelphia, Pa. (1910.)

Morse's safety valve. (1877.)

A. Orme's safety valve. (1877.)

W. E. Pierson, pop valve. (1883.)

Scott Valve Manufacturing Co., Detroit, Mich., formerly the Roe Stephens Manufacturing Co., Detroit, Mich., spring safety valve. (1892, 1919.)

R. F. Silliman's safety valve. (1884.)

Star Brass Manufacturing Co., pop safety valve. (1898.)

Roe Stephens Manufacturing Co., Detroit, Mich. See Scott Valve Manufacturing Co.

Talbot combined main stop and safety valve, Talbot Boiler Co., Seattle, Wash. (1915.)

H. G. Trout, King Iron Works, Buffalo, N. Y., spring-loaded safety valve, and allowed a rating of 2 square feet of grate surface of boiler to 1 square-inch area of valve to June 1, 1904. (1885.)

Utica pop safety valve presented by the Utica Steam Gauge Co., of Frankfort, N. Y. (1900.)

## MESSAGE CASES.

Nautilus message case, presented by Capt. Wm. J. Crosby, Detroit, Mich. (1914.)

Reliance message case, presented by Joseph E. Meno, Detroit, Mich. (1914.)

## WATER LIGHTS.

Coston Res-Q-Lite for ring buoys, presented by the Coston Supply Co., New York, N. Y. (1916, 1920.)
Coston Standard Water Lights for rafts, presented by the Coston Signal Co., New York, N. Y. (1916.)
Coston Supply Co. (Inc.), New York, N. Y. Res-Q-Light, copper water light. (1924.)
C. C. Galbraith & Son, New York, N. Y. (1918, 1926.)
G. R. Holmes, Baltimore, Md. (1920.)
Hook seam, emergency, self-lighting, life-buoy light, presented by Henry J. Pain, New York, N. Y. (Nov., 1916.)
David Kahnweiler's Sons, New York, N. Y., Rescue signal water light. (1916.)
Henry J. Pain, New York, N. Y., Hook seam, emergency, self-lighting, life-buoy light. (Nov., 1916.)
Rescue signal water light, presented by David Kahnweiler's Sons, New York, N. Y. (1916.)
Save-U-Lites, presented by the Automatic Lite Co., Baltimore, Md. (1927.)

## PIPE BOILERS.

[Boilers and steam generators not constructed of riveted iron or steel plates, approved under sec. 4429, R. S.]

Acme boiler, Detroit Water Tube Boiler Co., Detroit, Mich. (1902.)
F. S. Allen, New York, N. Y. (1884.)
Almy Water Tube Boiler Co., Providence, R. I. (Types A, B, and C, 1890; types D and E, 1897; Z type, 1911; Type A modified, 1925.)
F. D. Althouse, New York, N. Y. (1889.)
American Fire Engine Co., Cincinnati, Ohio. (1900.)
J. L. Anderson, Seattle, Wash. (1904.)
George W. Arrowsmith, Fort Niagara, N. Y. (1894.)
Aultman & Taylor Machinery Co., Mansfield, Ohio, Park water-tube boiler. (1905.)
Authentic water-tube boiler, Bugbee & Laycock, Chicago, Ill. (1901.)
Babcock & Wilcox, New York, N. Y. (1894; improved type, 1911; drum type, 1911; drum type, 1912; express type, 1914.)
The Babcock & Wilcox Co., New York, N. Y., White-Forster steam generator. (1909.)
The Babcock & Wilcox Co., New York, N. Y. (Modified drum construction, 1928.)
Badenhausen Co., Philadelphia, Pa., improvements in Badenhausen boiler. (1918.)
John P. Badenhausen, Seattle, Wash. (1911; improvements, 1918.)
Augustus Bailey, Spuyten Duyvil, N. Y. (1893.)
E. W. Bailey, Portsmouth, Va. (1907.)
Baker Motors (Inc.), Erie, Pa. (1925.)
Fred A. Ballin, Portland, Oreg. (1906; types Nos. 2 and 3, 1909; improved boiler, 1914.)
Ballin Water Tube Boiler Co., Portland, Oreg., new design of Ballin water-tube boiler. (1917.)
Barnes pipe boiler, presented by Pierre Barnes, Seattle, Wash. (1909.)
Barr & Creelman, Rochester, N. Y. (1900.)
Barr, Reynolds & Co., Rochester, N. Y., E. P. Clapp boiler No. 1. (1897.)
John E. F. Bartlett, Brooklyn, N. Y. (1891.)
Barton Boiler Co., Chicago, Ill., Barton's flash boiler. (1904.)
Bath Iron Works (Ltd.), Bath, Me., Normand boiler. (1914.)
A. J. Beach, Moline, Ill. (1898.)
James Beggs & Co., New York, N. Y., modification of Worthington boiler. (1918.)
The Belleville boiler, presented by Miers Coryell, of New York. (1887.)
C. R. Benton, Vergennes, Vt. (1896.)
B. F. Binnix, Washington, D. C. (1906.)
A. Perry Blivin, Brooklyn, N. Y. (1885.)
W. J. Boland, Chicago, Ill. (1900.)
George Bolland, Pittsburgh, Pa. (1897.)
John Bonner, Tiburon, Calif. (1895.)
Bonson boiler, Lyons Co., De Pere, Wis. (1905.)
Braggin's boiler. See Rochester Machine Tool Works.
Edward Bounds, Pittsburgh, Pa. (1898.)

Bowdish, Skaneateles, N. Y. (1890.)
George D. Bower, Trenton, N. J. (1893.)
Alfred Box & Co., Philadelphia, Pa. (1892.)
L. Boyer's Sons, New York, N. Y. (1894, 1901.)
Ira Bradley, Malden, Mass. (1892.)
Braggin's, Rochester Machine Tool Works, Rochester, N. Y. (1889, 1894.)
Joseph G. Brassard, Central Falls, R. I. (1898.)
George B. Brayton, Providence, R. I. (1885.)
Bretherton boiler, James C. Wignall, Philadelphia, Pa. (1897.)
Brigham & Markham, Hartford, Conn. (1889.)
James H. Brown, Boston, Mass. (1898.)
Buckley Patent water-tube pipe boiler, Rochester Machine Tool Works, Rochester, N. Y. (1896.)
Bugbee & Laycock, Chicago, Ill. Authenic water-tube boiler. (1901.)
Burton semisectional water-tube boiler, De Pere-Burton Co., West De Pere, Wis. (1920.)
Buschmann & Layman, Baltimore, Md. (1895, 1897.)
Buxton-Wilson, Inc., Norfolk, Va., porcupine boiler. (1921.)
James Carnegie, New York, N. Y., Type B. (1899.)
Carnegie Steel Co., Pittsburgh, Pa. (1920.)
Cary's steam generator, changed from Gray's, Providence, R. I. (1891.)
Charles D. Casad, Seattle, Wash. (1902.)
The Casey-Hedges Co., Chattanooga, Tenn. (C-H water-tube boiler, 1917; vertical baffle type C-H water-tube boiler, 1918).
J. Castleman, Brooklyn, N. Y., T. F. Morrin's pipe boiler. (1898.)
C. H. Caswell, Newport, R. I. (1887.)
E. P. Chancellor, Parkersburg, W. Va. (1898.)
Ed. Cheetham, Detroit, Mich. (1900.)
Christiansen marine boiler, John A. Duggan, Boston, Mass. (1894.)
Clapp & Jones Manufacturing Co., Hudson, N. Y. (1889.)
E. P. Clapp boiler No. 1, Barr, Reynolds & Co., Rochester, N. Y. (1897.)
Baylies C. Clark, New York, N. Y. (1896.)
C. B. Clark, South Brewer, Me. (1902.)
E. P. Clark, New York, N. Y. (1894.)
Edward S. Clark, Boston, Mass. (1891, 1895, 1898.)
Louis S. Clark, Pittsburgh, Pa. (1893.)
W. T. Clark, Boston, Mass. (1897.)
Clay & Torbensen, Camden, N. J. (1892.)
Fred Cline, Hoquiam, Wash. (1911.)
Clonbrock Steam Boiler Co., Brooklyn, N. Y. (1891.) The Morrin Climax steam generator, improved boiler. (1902.)
E. J. Codd, Baltimore, Md., Smith patent boiler. (1904.)
Cole & Reinhart, Camden, N. J. (1892.)
Coller Yacht & Engine Works, Detroit, Mich., Coller sectional boiler. (1893, 1895.)
J. M. Colman, Everett, Wash. (1916.)
Colven water-tube boiler, New York Engineering Co., New York, N. Y. (1918.) Type, 1919. Name changed to Ludlum water-tube boiler. (1920.)
Peter Cone, Jacksonville, Fla. (1899.)
D. Connelly Boiler Co., Cleveland, Ohio, Connelly standard water-tube boiler of the drum and bent-tube type, and the Connelly water-tube boiler of the header and straight-tube type. (1917.)
B. F. Cook, Fort Pierce, Fla. (1902.)
Will F. Cook, Oshkosh, Wis. (1906.)
Copeland boiler, when composed in all its parts of wrought iron, copper, brass, or steel, Northrop Manufacturing Co. (1888.)
E. J. Copeland, New York, N. Y. (1891.)
A. E. Corey, Allegheny, Pa. (1893.)
Miers Coryell, New York, the Belleville boiler. (1887.)
The Coulter & McKenzie Machine Co., Bridgeport, Conn. (1894.)
C. R. Cowley, Brooklyn, N. Y. (1895.)
Chas. R. Cowley and Howell C. Cooper, Everett, Mass., Cowley & Cooper boiler. (1901.)
Craig Shipbuilding Co., Long Beach, Calif. (1915.)
J. F. Craig, Toledo, Ohio, Craig water-tube boilers, Nos. 1 and 2. (1896.)
William Cramp & Sons, Philadelphia, Pa., Yarrow type No. 2, and Niclausse water-tube boiler. (1897.)
Crawford & Saunier, Newark, N. J. (Passaic, 1890: Gem, 1891.)

C. B. Crowley & E. B. Browne, Brooklyn, N. Y. (1889.)
Cruichshank, Providence, R. I. (1890.)
H. B. Cumming, Malden, Mass. (1889.)
Osceola Currier, Newark, N. J. (1897.)
Daring type of Thornycroft boiler, Thorpe, Platt & Co., New York, N. Y. (1897.)
A. D. Davis, Yonkers, N. Y. (1899.)
L. D. Davis, Erie, Pa. (1891, 1894, 1898.)
C. F. Davenport, Brooklyn, N. Y., assigned to Empire State Engineering Co., New York, N. Y. (1904.)
J. W. Dawson, Wyandotte, Mich. (1895.)
De Pere-Burton Co., West De Pere, Wis., Burton semisectional water-tube boiler. (1920.)
Charles De Vore, Philadelphia, Pa. (1894.)
Anson C. Dearing, Detroit, Mich. (1894.)
Dearing water-tube boiler, Detroit, Mich. (1897.)
Detroit Screw Works, Detroit, Mich., Taylor boiler. (1898.)
Detroit Water-Tube Boiler Co., Detroit, Mich. (1899.) The Acme boiler. (1902, 1914.)
W. E. Dickey, New York, N. Y., porcupine boiler. (1902.)
Dieter Steam Engine Co., New York, N. Y., C. M. Raymond steam boiler. (1905.)
Dobler boiler attachment or water heater, presented by W. R. Miller, New York, N. Y. (1906.)
Robert Don, Stockton, Calif. (1897.)
George E. Dow, Seattle, Wash. (1894.)
J. J. Driscoll, Stapleton, N. Y. (1894.)
E. N. Drouillard, Wyandotte, Mich., Drouillard water-tube boiler No. 1. (1896.)
John A. Duggan, Boston, Mass., Christiansen marine boiler. (1894.)
P. F. Dundon, San Francisco, Calif. (1916.)
Dyson water-tube boiler, The Charles Ward Engineering Works, Charleston, W. Va. (1920.)
E. G. Durant, for using petroleum. (1888.)
William F. Duval, Jersey City, N. J. (1904.)
F. W. Edwards, Bayonne, N. J. (1899.)
Emergency Fleet Corporation's standard water-tube boiler, Emergency Fleet Corporation, Washington, D. C. (1917; modification, 1917.)
Benjamin P. Emery, Kennebunkport, Me. (1899.)
Henry Ernst, New York, N. Y. (1901.)
A. C. Evans, Norfolk, Va. (1901.)
W. S. Fairchild, Newark, N. J. (1892.)
Farnie & Geer, Syracuse, N. Y.; the Farnie boiler, steam pressure to be allowed on such boiler as the bracing will entitle the same to carry. (1887.)
Thomas Fearon, Yonkers, N. Y. (1893, 1895, 1897.)
A. W. Finlayson, Detroit, Mich. (1896.)
Fenlayson & Popkins, Detroit, Mich. (1893.)
William Flagg, Bayonne, N. J. (1895, 1898.)
William Flaggs, Brooklyn, N. Y. (1891.)
John A. Flajole, Bay City, Mich. (1894.)
Fore River Engine Co., Weymouth, Mass. (1897.)
Foster marine boiler, Power Specialty Co., New York, N. Y. (1917.)
Charles W. Foster, New Haven, Conn. (1892, 1894, 1895.)
Walter B. Fowler, Lawrence, Mass. (1892.)
Fowler-Wolfe Sheet Metal Works, Paducah, Ky., improvement in Kidney boiler. (1915.)
H. E. Frauz, steam generator; presented by J. H. Mittendorff, Washington, D. C. (1895.)
H. H. Frederick, New Orleans, La., 3 horsepower. (1893.)
Hugo L. Frederick, copper boiler. (1889.)
Horace Furman, Petersburg, Va. (1918.) Two steam drums replaced with one and other modification. (1919.)
R. J. Galbraith, Albany, Oreg. (1911.)
R. J. Galbraith, Coquille, Oreg. (1916; one with cast-steel heads, 1917.)
Siren Galliher, Normal, Ky. (1898.)
C. F. Gallion, Baltimore, Md. (1895.)
Gas Engine & Power Co. and Charles L. Seabury & Co., New York, N. Y. (Types E, Alga, and Enterprise, 1898; Kanawha type, 1899; D improved and E improved, 1903.) See Charles L. Seabury & Co.
James S. Gedeohn, Cleveland, Ohio, pipe boiler. (1892.)

Gem boiler, Crawford & Saunier, Newark, N. J. (1891.)
E. U. Gibbs, Elmira, N. Y. (1894.)
F. G. Gibson, Dorchester, Mass. (1899.)
J. M. Glover, Baldwin, Long Island, N. Y. (1892.)
T. W. Godwin & Co., Norfolk, Va. (1896.)
Goodridge attachment for oil boilers. (1891.)
Thomas Gowen, Seattle, Wash. (1908.)
Gray's steam generator, Providence, R. I. Name changed to Cary's. (1891.)
Samuel M. Gray, Providence, R. I. (1890, 1896.)
Griswold pipe generator, Henry Suttor. (1893.)
Henry Haenel, St. Augustine, Fla. (1894.)
George L. Haman, Detroit, Mich. (1901.)
H. J. Hancock, New York, N. Y., Howard steam generator. (1893.)
T. Hansen, Boston, Mass. (1891.)
George Harden, Detroit, Mich. (1895.)
Gordon H. Hardie, Victoria, British Columbia. (1902.)
A. C. Harding, Chicago, Ill. (1893.)
The Hartley boiler, presented by the Pioneer Iron Works, Brooklyn, N. Y. (1887.)
C. W. Hawkes, Chicago, Ill. (1906.)
Gardener C. Hawkins, Boston, Mass. (1892.)
Hawley Inventions (Inc.), Minneapolis, Minn. Hawley boiler. (1928.)
E. Hayes, Rochester, N. Y. (1891.)
Hazelton Co., water-tube porcupine boiler. (1886.)
S. P. Hedges, Greenport, N. Y. (1885, 1889, 1895.)
Heine safety boiler, by E. D. Meier, St. Louis, Mo. (1895. Superheater presented by Heine Safety Boiler Co., St. Louis, Mo., 1916.)
Heine Safety Boiler Co., Phoenixville, Pa. Meier boiler and superheater. (1917.) Superheater approved, and modifications. (1919.)
A. C. J. Hennig, Seattle, Wash. (1916.)
Frank A. Hensley, San Antonio, Tex., porcupine boiler. (1906.)
William H. Herbertson, Cadwallader, Pa. (1896.)
Hermens Steam Motor Co. (Inc.), Portland, Oreg. (1920.)
Herreshoff, Bristol, R. I. (1873, 1878, 1898.)
Type of Herreshoff boiler, presented by Herreshoff Manufacturing Co., Bristol, R. I. (1919.)
Hohenstein, Newark, N. J. (1890.)
Hohenstein marine boiler, presented by Oil City Boiler Works, New York, N. Y. (1907.)
George H. Holmes, Gardiner, Me. (1894.)
Henry A. House, Bridgeport, Conn. (1897.)
Howard steam generator, H. J. Hancock, New York, N. Y. (1893.)
Howden & Co., Glasgow, Scotland. (1915.)
Henry E. Hull, Clinton, Conn. (1899.)
A. M. Hunt, Tacoma, Wash. (1914.)
Hunt straight-tube sectional boiler, Type A, A. M. Hunt & Son, Tacoma, Wash. (1922.)
Hunt Type C steam generator, A. M. Hunt, Tacoma, Wash. (1923.)
Hampden Hyde, Rochester, N. Y. (1894.)
V. R. Hyde, Portland, Oreg., the H. Statesmen boiler. (1886.)
F. W. Hyslop, New York, N. Y. (1892.)
International Power Co., Providence, R. I. (1900.)
J. R. Jackson, McKeesport, Pa. (1894.)
Ernest N. Janson, Washington, D. C. (1901.)
J. B. Jardine, San Francisco, Calif. (1894.)
W. E. Jenkins and A. Stokey, Tacoma, Wash. (1900.)
Ernest A. John's boiler, New York, N. Y. (1892.)
Johnston Service Co., Milwaukee, Wis. (1907.)
Geo. E. Jones, Newark, N. J. (1900.)
Robert Joy, Oswego, N. Y. (1918.)
Kaelma boiler. Charles H. Kimball, Plattsburg, N. Y. (1902.)
John R. Karstendick, New Orleans, La. (1884.)
Keep & Co., Portland, Oreg. (1904.)
Chas. Kellogg, Athens, Pa. (1900.)
James W. Kidney, Point Pleasant, W. Va., combination water-tube and fire-tube boiler. (1912. Improvement, 2 shells, 1913; improvement, 1915.) See Fowler-Wolfe Sheet Metal Works.

Changes in construction of Kidney boiler, presented by the Marietta Manufacturing Co., Point Pleasant, W. Va. (1919.)
Charles H. Kimball, Plattsburg, N. Y.; Kaelma boiler. (1902.)
J. H. King, Daytona, Fla. (1899. Modification, 1900, presented by J. B. Sloan, Jacksonville, Fla.)
Charles L. Kraemer, New York, N. Y. (1898.)
Geo. Krill & Bro., Baltimore, Md. (1900.)
C. W. Krotz, New Orleans, La. (1903.)
Kingsford-Webster water-tube boiler, Kingsford Foundry & Machine Works, Oswego, N. Y. (1922.)
J. Lacroix and Ed Rey, New Orleans, La. (1892, 1898.)
L. A. Langmaid, Bath, Me. (1901.)
Laughlin & Co., Pittsburgh, Pa. (1893.)
Geo. Lawley & Son Corporation, Boston, Mass. (1900.)
Harry Lawson, Jersey City, N. J. (1900.)
Harry Lawson, New York, N. Y. (1904.)
Thomas H. Lee, Seattle, Wash. (1917.)
U. G. Lee, Chicago, Ill. (1904.)
Joseph C. Lesley, St. Albans, Vt. (1900.)
Paul W. Lichtenberger, Philadelphia, Pa. (1897.)
Lidback Manufacturing Co., Portland, Me. (1890.)
S. C. Lighthill, Allegheny, Pa. (1900.)
Locomotive boiler; presented by the Locomobile Co. of America, Chicago, Ill. (1904.)
L. W. Loomis, Carrollton, Ill. (1896.)
Luther D. Lovekin, of New York Shipbuilding Co., Camden, N. J., type of Thornycroft boiler. (1912.)
W. S. Lowe, Lima, Ohio. (1900.)
J. H. & J. D. Lucas, St. Louis, Mo. (1895.)
Ludlum water-tube boiler. Name changed from Colven water-tube boiler in 1920. Colven boiler approved in 1918. Type B Ludlum boiler approved in 1922. New York Engineering Co., New York, N. Y.
Luippold Bros., Buffalo, N. Y. (1897.)
John H. Lutz, Michigan City, Ind. (1894.)
Lyons Co. furnace boiler, Depere, Wis., Bonson type. (1905.)
William H. C. Lyons, Philadelphia, Pa. (1896.)
Walter MacFarlane, Seattle, Wash. (1900.)
McBride Bros.' boiler, Philadelphia, Pa. (1892.)
W. J. McCaffrey and Charles Hilbert, Sing Sing, N. Y. (1895.)
James McCartney, Mobile, Ala. (1904.)
C. McDonagh, Hancock, Mich. (1892.)
The W. D. McNaull water-tube boiler, Toledo, Ohio. (1905.)
McQueen boiler, Sullivan & Ehler, Albany, N. Y. (1891.)
J. W. McQueen, Detroit, Mich. (1899.)
E. A. Magee, Brooklyn, N. Y. (1893.)
Frank Mahoney, New York, N. Y., a horizontal boiler and a vertical boiler. (1892.)
George H. Mallett, Westchester, N. Y. (1898.)
Marietta Manufacturing Co., Point Pleasant, W. Va., changes in construction of Kidney boiler. (1919.)
Marine Iron Works, Chicago, Ill. (1901.)
G. F. Martin, St. Joseph, Mich. (1897.)
George F. Martin, Benton Harbor, Mich. (1898.)
Tug *Maytham*, Houghton, Mich., copper fire furnace, special. (1899.)
Meier boiler and superheater, Heine Safety Boiler Co., Phoenixville, Pa. (1917.) Superheater approved, and modifications. (1919.)
E. D. Meier, St. Louis, Mo., Heine safety boiler. (1895. Superheater, Heine Safety Boiler Co., St. Louis, Mo., 1916.)
E. W. Millard, Troy, N. Y. (1889.)
August Miller, Jefferson Parish, La. (1897.)
Philip J. Miller, Annapolis, Md. (1903.)
W. R. Miller, New York, N. Y., Dobler boiler attachment or water heater (1906.)
Miner flash steam generator, Winthrop Waite, New York, N. Y. (1907.)
J. H. Mittendorff, Washington, D. C., H. E. Frauz steam generator. (1895.)
John Mohr & Sons, Chicago, Ill. (1896.)
Joseph Mohr, Chicago, Ill. (1893.)
Monarch water-tube boiler, W. Wesley Werback, Toledo, Ohio. (1919.)

W. J. Montgomery, Detroit, Mich. (1911.)
Edward J. Moore, Philadelphia, Pa. (1899.)
W. W. Moore, Eugene, Oreg. (1894.)
I. G. Morgan, Seattle, Wash. (1894.)
The Morrin Climax steam generator, Clonbrock Steam Boiler Co., Brooklyn, N. Y. (1891. Improved boiler, 1902.)
T. F. Morrin's pipe boiler, J. Castleman, Brooklyn, N. Y. (1898.)
T. F. Morrin, Brooklyn, N. Y., horizontal and vertical types of water-tube boiler. (1900.)
James J. Morris, Nashville, Tenn., flash boiler. (1910.)
C. B. Mosher. Amesbury, Mass. (1891.)
Charles D. Mosher, Mosher Water Tube Boiler Co., New York, N. Y., types A and B. (1904.)
R. Munroe & Son, Pittsburgh, Pa. (1894.)
Nelis steam generator, Joseph J. Nelis, vice president Foster Marine Boiler Corporation, New York, N. Y. (1927.) (Modifications, 1928.)
New York Engineering Co., New York, N. Y. See Ludlum and Colven.
New York Safety Steam Power Co., New York, N. Y., the Worthington boiler. (1891, 1897.)
New York Shipbuilding Co., Camden, N. J. (1902.)
Newport News Shipbuilding & Dry Dock Co., Newport News, Va., type of Thornycroft boiler. (1910.)
Niclausse water-tube boiler; William Cramp & Sons, Philadelphia, Pa. (1897.)
Noel marine tubular boiler, Fabian P. Noel, Washington, D. C. (1918.)
Normand boiler, presented by Bath Iron Works (Ltd.). (1914.)
Northrup Manufacturing Co., Copeland boiler, when composed in all its parts of wrought iron, copper, brass, or steel. (1888.)
Nott marine boiler, Nott Fire Engine Co., Minneapolis, Minn. (1906.)
Harvey T. Nye, Toledo, Ohio. (1908.)
O'Brien water-tube boiler, John O'Brien Boiler Works Co., St. Louis, Mo. (1928.)
Ofeldt's, Newark, N. J. (1889.)
August Ofeldt, New York, N. Y., circular pipe boiler and squaer pipe boiler. (1909.)
F. W. Ofeldt & Sons, Brooklyn, N. Y. (1901.)
Charles Ogle and James Hall, Jeffersonville, Ind. (1897.)
Oil City Boiler Works, New York, N. Y., Hohenstein marine boiler. (1907.)
William Oldman, jr., Buffalo, N. Y., horizontal and vertical boilers. (1896, 1897.)
James E. Orme and Henry H. Orme, St. Paul, Minn. (1902.)
Marvin E. Otis, Rochester, N. Y. (1891.)
Page Boiler Co., Chicago, Ill. Page sectional water-tube boiler. (1919.)
George E. & Charles A. Painter, Pittsburgh, Pa. (1896.)
D. A. Park, Brooklyn, N. Y. (1897.)
Park water-tube boiler, Aultman & Taylor Machinery Co., Mansfield, Ohio. (1905.)
Parker Boiler Co., Philadelphia, Pa. (1901.)
Charles S. Parker, Orange, Tex. (1895.)
Dr. E. L. Parker, Detroit, Mich. (1898.)
J. E. Parker, Chicago, Ill. (1900.)
Passaic boiler, Crawford & Saunier, Newark, N. J. (1890.)
Pearson Manufacturing Co., Allegheny, Pa., Pittsburgh boiler. (1904.)
Perkins & Richmond, Grand Rapids, Mich. (1894.)
Thomas B. Perkins, Grand Rapids, Mich. (1901; improved porcupine boiler, 1903.)
Archibald Pifer, Braidentown, Fla. (1900.)
Pioneer Iron Works, Brooklyn, N. Y., the Hartley boiler. (1887.)
Pittsburgh boiler, Pearson Manufacturing Co., Allegheny, Pa. (1904.)
William E. Plummer, jr., Buffalo, N. Y. (1896.)
M. H. Plunkett, boiler, Nos. 1 and 2, Baltimore, Md. (1892.)
S. T. Powers, New Orleans, La., porcupine boiler. (1903.)
R. C. Price, Allegheny, Pa. (1895.)
Frank Printz, New Orleans, La. (1895.)
Joseph Provuncher, East Providence, R. I. (1896, 1898.)
Puget Sound Machinery Depot, Seattle, Wash., Scott water-tube boiler. (1921.)
Racine Boat Manufacturing Co., Muskegon, Mich., Racine water-tube boiler. (1904.)
C. M. Raymond steam boiler, the Dieter Steam Engine Co., New York. N. Y. (1905.)
C. Reinhardt, Baltimore, Md. (1895.)
A. L. Rhodes, West Superior, Wis. (1902.)

H. L. Ricks, Eureka, Calif., Salamandrine boiler, manufactured by the Salamandrine Boiler Co., Newark, N. J. (1903.)
Risdon Iron Works, San Francisco, Calif. (1904.)
Risdon Iron and Locomotive Works, San Francisco, Calif. (1910.)
J. B. Rives, St. Paul, Minn., Waterous boiler. (1896.)
E. E. Roberts, New York. (1883.)
Roberts water-tube boiler, New York, N. Y. (1883; improvements in boiler, 1895, 1912; types F, G, H, and I, 1897.)
Roberts Safety Water Tube Boiler Co., Red Bank, N. J.
Roberts water-tube boiler, modification consisting of drum with bumped head. (1912.)
E. Gerry Roberts, Red Bank, N. J.; Star in the Diamond boiler. (1917.)
F. J. Robinson, Detroit, Mich. (1891.)
Josiah Robinson, Watervliet, N. Y. (1904.)
Rochester Machine Tool Works, Rochester, N. Y. (Braggin's boiler, 1889, 1894; Buckley patent water-tube pipe boiler, 1896.)
Willis W. Roff and N. W. Bower, Douglas, Alaska. (1920.)
Charles G. Rogers, water-tube boiler (modified form Roberts coil boiler), Pittsburgh, Pa. (1905.)
James J. Rohan, St. Louis, Mo. (1908.)
Phil Rohan, St. Louis, Mo., Western water-tube boiler. (1898.)
Erdix Rounds, Owensboro, Ky. (1900.)
D. Rousseau, New York, N. Y. (1894.)
Martin R. Ruble, Newark, N. J. (1891.)
T. W. Rucker, St. Louis, Mo. (1899.)
Ruemmeli-Dawley Manufacturing Co., St. Louis, Mo. Boiler approved, and change in construction. (1919, 1920.)
Jacob Ruf, Newark, N. J. (1899.)
Charles A. Rush, San Francisco, Calif. (1909.)
Salamandrine boiler, manufactured by the Salamandrine Boiler Co., Newark, N. J., presented by H. L. Ricks, Eureka, Calif. (1903.)
W. J. Sanderson, Syracuse, N. Y. (1890.)
Emil Santsche, Eureka, Calif., porcupine boiler. (1903.)
Lewis Saunders, Lawrence, Mass. (1894.)
Stillman Saunders, Providence, R. I. (1893.)
Schwing & Greaud, Gramercy, La. (1904.)
Scott Engine & Construction Co., New York, N. Y. Types A and B. (1908.)
Scott water-tube boiler, Puget Sound Machinery Depot, Seattle, Wash. (1921.)
Charles L. Seabury, Nyack, N. Y. (1889, 1891, 1894, 1895, 1897.) See G, Gas Engine & Power Co. and Charles L. Seabury & Co.
Seachrist & Parker, Erie, Pa. (1893.)
Horace See, New York, N. Y. (1895; improvements Nos. 1 and 2, 1904.)
The Shaffer Machine & Manufacturing Co., Baltimore, Md. (1902.)
J. A. Shaw, Newark, N. J. (1904.)
Isaac E. Shepardson, Providence, R. I. (1896.)
John C. Sherry, Portland, Oreg. (1917.)
The Shipman boiler, for using petroleum. (1886.)
Shortt Duplex Boiler Co., New York, N. Y. (1892.)
William Skelton, jr., Buffalo, N. Y. (1895.)
Halcyon Skinner, Yonkers, N. Y. (1895.)
J. B. Sloan, Jacksonville, Fla., presents boiler of J. H. King, Daytona, Fla. (1899. Modification, 1900.)
Smith patent boiler, presented by E. J. Codd, Baltimore, Md. (1904).
Jacob H. Smith, Baltimore, Md. (1895.)
W. D. Smith, Detroit, Mich. (1892.)
Speedy type of Thornycroft boiler, Thorpe, Platt & Co., New York, N. Y. (1897.)
Spokane Machinery Supply Co., water-tube boiler. (1905.)
Richard Spreckles and Walter J. Wayte, San Francisco, Calif. (1898.)
B. T. Squier, New York, N. Y. (1895.)
Benjamin T. Squier, Brooklyn, N. Y., Towne water-tube boiler. (1906.)
Stanley Motor Carriage Co., Newton, Mass. Shell is made of steel plate wound with steel piano wire. (1912.) New address: Steam Vehicle Corporation of America, Newton, Mass. (1925.)
Star in the Diamond boiler, E. Gerry Roberts, Red Bank, N. J. (1917.)
Stark & Carlyle water-tube boiler, David Stark and Arthur R. Carlyle, San Francisco, Calif. (1912.)
The H. Statesmen boiler, V. R. Hyde, Portland, Oreg. (1886.)
James B. Stead, sectional water-tube boilers, Nos. 1 and 3. (1888.)

Steam Vehicle Corporation of America, Newton, Mass. (New address for Stanley Motor Carriage Co., 1925.)
Wallace Stebbins & Sons, Baltimore, Md. (1900.)
Lee H. Stevens, New Albany, Ind. (1894, 1895.)
Stickney safety steam generator, H. R. Stickney, Portland, Me. (1905.)
Charles Stillwell, Hampton, Va. (1898.)
Harris K. Stroud, Hastings, Minn. (1890.)
Studdert Pipe Boiler Co., Seattle, Wash., improvement in Taylor boiler approved in 1895. (1915.)
Thomas L. Sturtevant, Boston, Mass. (1891, 1892, 1895.)
Sullivan & Ehler, Albany, N. Y., McQueen boiler. (1891.)
Henry Sutter, Griswold pipe generator and Sutter sectional porcupine boiler. (1893.)
George W. Swartz, Decatur, Ala., porcupine boiler. (1902.)
John M. Sweeney, Chicago, Ill., combination fire-tube and water-tube boiler. (1912.)
Tabrett & Lewin, San Francisco, Calif. (1903.)
Paul A. Talbot, Seattle, Wash. (1911; improvement, 1915.)
Taunton Automobile Co., Taunton, Mass., porcupine boiler. (1903.)
Taylor boiler, Detroit Screw Works, Detroit, Mich. (1898.)
Taylor Bros., Trenton, N. J. (1893.)
H. H. Taylor, Detroit, Mich. (1895; improved, 1915.)
Winthrop Thayer, Boston, Mass. (1897.)
W. C. Thompson, Philadelphia, Pa. (1897.)
Thornycroft boiler, Daring and Speedy types. Thorpe, Platt & Co., New York, N. Y. (1897.)
Thornycroft boiler, type presented by Newport News Shipbuilding & Dry Dock Co., Newport News, Va. (1910.)
Thornycroft boiler, type designed by Luther D. Lovekin, of New York Shipbuilding Co., Camden, N. J. (1912.)
Thorpe, Platt & Co., New York, N. Y., Thornycroft boiler, Daring and Speedy types. (1897.)
William R. Thropp, Trenton, N. J. (1906.)
W. J. Tierney and William Marquez, New Orleans, La. (1895.)
B. Louis Toquet, Westport, Conn. (1893, 1894.)
W. M. Towers, Rome, Ga. (1897.)
Towne water-tube boiler, Benjamin T. Squier, Brooklyn, N. Y. (1906.)
John Trasher, New Orleans, La. (1902.)
G. E. Tregurtha, Boston, Mass. (1890, 1892.)
Union marine water-tube boiler, Union Iron Works, Erie, Pa. (1918.)
N. A. Uren, Juneau, Alaska. (1907; modification, N. A. Uren, jr., Seattle, Wash. (1912.)
Vashon Navigation Co., Tacoma, Wash. (1917.)
E. H. Vincent, Steam Automotive Corporation, Oakland, Calif., Vincent steam generator. (1928.)
J. E. Vincent, Palatka, Fla., a water-tube boiler and a porcupine boiler. (1902.)
Emil Volk, New York, N. Y. (1894.)
Wadham, 1315 Third Avenue, New York, N. Y. (1890.)
Winthrop Waite, New York, N. Y., the Miner flash steam generator. (1907.)
E. C. Walker Co., Louisville, Ky. (1907.)
J. W. Walters & Co., sectional water-tube boiler. (1888.)
Charles Ward, Charleston, W. Va. (1883; coil boiler and Navy horizontal pipe boiler, 1894; Ward's torpedo-boat boiler, Ward's torpedo-boat boiler No. 2, Ward's straight-tube launch boiler, 1895; Ward's Royal Arch or Navy boiler, 1897.)
Electric welding allowed for construction of headers of Ward water-tube boilers, presented by The Charles Ward Engineering Works, Charleston, W. Va.
The Charles Ward Engineering Works, Charleston, W. Va., Dyson water-tube boiler. (1920.) Superheater to be used in connection with Ward boiler. (1920.)
Charles E. Ward, Charleston, W. Va. (1912.)
Warner & Papst, San Francisco, Calif. (1893.)
George Warrington, Chicago, Ill. (1895, 1902.)
George & James Warrington, Chicago, Ill. (1891.)
S. Waterhouse, Boston, Mass. (1884.)
Waterous boiler, J. B. Rives, St. Paul, Minn. (1896.)
Watson & Peterson, Kansas City, Mo. (1897.)
Egbert P. Watson, Elizabeth, N. J. (1898; modification, 1900; porcupine boiler, 1903.)
Charles M. Weber, Cincinnati, Ohio. (1897.)

W. Wesley Werback, Toledo, Ohio. Monarch water-tube boiler. (1919.)
W. Frank West, Morris Heights, N. Y. (1895.)
Western water-tube boiler, Phil Rohan, St. Louis, Mo. (1898.)
R. Weston & A. M. Lemke, Saginaw, Mich. (1896.)
White patent steam generator, presented by The White Garage, Cleveland, Ohio. (1907.)
Robert White, Brooklyn, N. Y. (1899.)
White-Forster steam generator, The Babcock & Wilcox Co., New York, N. Y. (1909.)
George L. Whittington, Sea Isle City, N. J. (1896.)
Whittlesey Superheating Boiler Co., Cleveland, Ohio. Whittlesey superheating boiler. (1918.)
The Wickes Boiler Co., Saginaw, Mich. Wickes marine water-tube boiler. (1917.) Changes in staying. (1919.) Modified. (1925.)
Wickes Bros., East Saginaw, Mich. (1893.)
James C. Wignall, Philadelphia, Pa., Bretherton boiler. (1897.)
C. A. Wilkerson, Lynn, Mass. (1892.)
Charles P. Willard, Chicago, Ill. (1896.)
D. Y. Williams, South Haven, Mich. (1894.)
Samuel T. Williams, Baltimore, Md. (1894; modification, 1899 and 1900.)
George S. Wolf, West Dover, Ohio. (1901.)
Beder Wood, Moline, Ill. (1899.)
H. T. Wood, Pittsburgh, Pa. (1908.)
O. H. Wood, Seattle, Wash. (1921.)
Worthington water-tube boiler, New York Safety Steam Power Co., New York, N. Y. (1891, 1897.)
Improvement in Worthington water-tube boiler, presented by James Beggs & Co., New York, N. Y. (1918.)
George L. Wright, North Andover, Mass. (1894.)
Benjamin A. Wyatt, Boston, Mass. (1897.)
Theodore H. Wyman, Sebec, Me. (1897.)
Yarrow type No. 2, William Cramp & Sons, Philadelphia, Pa. (1897.)
Yarrow water-tube boiler, New York, N. Y. (1892.)
Robert R. Zell & Co., Baltimore, Md. (1894.)

## RULINGS GIVEN BY THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL IN CONNECTION WITH THE HANDLING OF SO-CALLED DANGEROUS ARTICLES UNDER THE PROVISIONS OF SECTION 4472, REVISED STATUTES.

Acco roach and water bug exterminator may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, November, 1917.)

Acetalehyde shall not be transported on steamers carrying passengers. (Ruling, October, 1925.)

Acetic acid may be transported on steamers carrying passengers, when properly packed in quantities up to 10 pints, and in the same case with other chemicals when carefully packed and cushioned and inclosed in bottles containing not over 1 pint and not more than five bottles in one case. When transported in bulk on steamers carrying passengers it may be contained in drums or carboys and must be carried on deck of such vessels. (Ruling, November, 1918.)

Acetic anhydride may be transported on deck on steamers carrying passengers. (Ruling, November, 1915.)

Acetic ether shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1918.)

Acetone, according to a decision of the solicitor of the department, is not prohibited by section 4472, Revised Statutes, from being transported on steamers carrying passengers. (Ruling, January, 1915.)

Acetone oil, *light*, not only flashes but burns at room temperature and is clearly dangerous and, therefore, shall not be carried on steamers carrying passengers. (Ruling, July, 1914.)

Acetone oil, *heavy*, which will not ignite at a temperature less than 110° F., may be carried on steamers carrying passengers upon routes where there is no other practicable mode of transporting it, under the same conditions as refined petroleum. (Ruling, July, 1914.)

Acetyl chloride may be transported on deck on steamers carrying passengers. (Ruling, November, 1915.)

Acetylene may be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the requirements of the Interstate Commerce Commission with regard to the transportation of this commodity. (Ruling, April, 1919.)

Acetylene gas is not permitted to be produced on vessels carrying passengers, and the only way that it may be carried is in properly constructed tanks, which must comply with the requirements of the department. (Ruling, December, 1909.)

Acids not otherwise specified may only be carried on decks or guards of passenger vessels, except if the inspector allows otherwise. (R. S.)

Acid stain, fumed oak, may be transported on steamers carrying passengers without restrictions. (Ruling, May, 1922.)

Acme moving-picture projector, models 11 and 14, is approved for use on passenger and other vessels under the jurisdiction of the Steamboat Inspection Service, subject to the requirements of this service in connection with installation and the storing of the films. The slow-burning (acetate cellulose) and the inflammable (nitrocellulose) films for these projectors may be used in the booths. (Ruling, May, 1921.)

Activated coconut charcoal may be transported on steamers carrying passengers, when shipped in suitably constructed and tightly closed steel drums of a gross weight of about 220 pounds, it being further understood that this commodity shall not be carried in the lower hold. (Ruling, February, 1924.)

Adelite, paint and varnish remover, may be transported on steamers carrying passengers, under the same conditions as varnishes. (Ruling, August, 1926.)

Aerol essence shall not be used as stores on pleasure or passenger steamers, nor shall it be transported on steamers carrying passengers. (Ruling, June, 1922.)

Acrol essence, *diluted*, may be used as stores on pleasure and passenger vessels and may be transported on steamers carrying passengers. (Ruling, June, 1922.)

Aerzonator ceda bloc, manufactured by the United States Sanitary Specialties Corporation, New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1922.)

Afterglow satin-finish polish, manufactured by the Magnesium Products Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1922.)

Alcohol, grain, wood, denatured, and solidified, may be transported on steamers carrying passengers, provided it is not kept in a hot place and is so packed as to prevent any leakage. (Ruling, September, 1919.)

Allklean auto body polish, manufactured by the Allklean Manufacturing Co., Long Island City, N. Y., may be transported without restriction on vessels carrying passengers. (Ruling, November, 1926.)

Allklean nickel polish, manufactured by the Allklean Manufacturing Co., Long Island City, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1926.)

Almern lamp oil may be used as stores on passenger or pleasure steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Amalie nonburnable metal polish shall not be transported on steamers carrying passengers, or used as stores on passenger or pleasure steamers. (Ruling, November, 1914.)

Amazon roofing cement may be transported on steamers carrying passengers. (Ruling, July, 1916.)

American cream liquid metal polish may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, February, 1915.)

Ammonia, as the fumes are quite dangerous, should be transported in the standard cylinders prescribed by the Interstate Commerce Commission. (70078–11.)

Ammonia anhydrous. *See* Ammonia water.

Ammoniacal liquor is a commodity over which this service has no jurisdiction, but it is suggested that it be transported under conditions that meet the requirements of the Interstate Commerce Commission. (Ruling, November, 1927.)

Ammonia sulphate is permitted to be shipped in barrels and bags on steamers carrying passengers. (53686.)

Ammonia water and ammonia anhydrous are commodities over which this service has no jurisdiction, but it is suggested that they be transported under conditions that meet the requirements of the Interstate Commerce Commission. (76253.)

Ammonium hydrate may be transported in drums on steamers carrying passengers, or else in 4-pound bottles for the purest material. (70078–71.)

Ammonium hydrosulphuret may be transported on passenger steamers under the same conditions as aqua ammonia. (70078–11.)

Ammonium nitrate may be transported on steamers carrying passengers, provided it is specially stowed where it is readily accessible in case of fire. (70078–11.)

Ammunition, small-arms, may be transported without restriction on steamers carrying passengers, and it need not be confined to the magazine of the vessel as heretofore required, with the exception that large-caliber blank black-powder ammunition should be stowed as previously required in the magazine. (Ruling, May, 1911.) "Large caliber" means caliber of .30 or more. (Ruling, July, 1911.) This ruling does not apply to emigrant vessels, which are prohibited from carrying small-arms ammunition. (34135.) The term "Small-arms ammunition" applies to all sizes of cartridges and shells designed for use in small arms, such as rifles, revolvers, pistols, and shotguns, and ammunition of this kind may be transported on steamers carrying passengers without restriction. (Ruling, 1923.)

Amyl acetate (banana oil) may be transported on steamers carrying passengers, provided it is stowed in a cool place and not exposed to heat. (70078–71, 1918.)

Amyl alcohol may be transported on steamers carrying passengers, if in 1-pound containers, care being taken that it is not exposed to high temperature. (70078–71.)

Amylene shall not be carried on passenger vessels as stores or cargo. (70078–71.)

A–1 liquid metal polish, manufactured by the J. L. Prescott Co., Philadelphia, Pa., shall not be transported on steamers carrying passengers, and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

A No. 1 metal polish, manufactured by Chas. H. Rath & Co., shall not be carried on passenger steamers as stores or cargo. (Ruling, August, 1914.)

Archibald's no rub metal polish may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger steamers. (Ruling, June, 1919.)

Argon gas is not a dangerous article like those enumerated in section 4472, Revised Statutes, but, as there is a risk incurred in handling and transporting it incident to the bursting of the cylinders, it may be transported in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, September, 1922.)

Army and Navy metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, November, 1917.)

Arrow cleaner polish, manufactured by the Arrow Products Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1924.)

Arsenic may be transported on steamers carrying passengers, provided it is properly packed, and also that it is not placed where there is any possibility of its coming into contact with strong acids. (Ruling, December, 1916.)

Arsenic compounds, such as arsenious acid, sodium arsenate, Fowler's solution, Paris green, Donovan's solution, arsenical insecticides, and lead arsenate, are not ordinarily dangerous for transportation but should be packed securely in tight containers and in such manner as to reduce the chance for breakage to a minimum, when transported on steamers carrying passengers. The case should be labeled distinctly with the name of the article and the word "Poison." In pound packages or less, these articles may be packed with other chemicals or drugs. (Ruling, December, 1916.)

Arsenical insecticides. *See* Arsenic compounds.

Arsenious acid. *See* Arsenic compounds.

Asphalt, standard macadam asphalt binders and standard paving asphalt, may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, July, 1911.)

Asphalt goudron and liquid asphalt, the tests of which indicate that they are natural asphalt fluxed with petroleum residues and will not ignite at a temperature of less than 110° F., may be carried under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting them. (Ruling, February, 1912.)

Asphaltum No. 1 shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Atlas A illuminating oil may be transported on steamers carrying passengers and may be used as stores on such steamers. (Ruling, April, 1916.)

Atlas B illuminating oil may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, April, 1916.)

Aurora marine lamp oil and Aurora special lamp oil may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, April, 1916.)

Auto patching cement shall not be transported on steamers carrying passengers. (Ruling, June, 1922.)

Auto top dressing may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1922.)

Avenarious carbolineum. *See* Protexol.

Baco metal polish, manufactured by Bachmeier & Co., New York, N. Y., may be transported on steamers carrying passengers, without restriction. (Ruling, July, 1922.)

Banana oil. *See* Amyl acetate.

B. & W. velvet metal paste may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (Ruling October, 1916.)

Barber brand asphalt. *See* Positive sealing priming.

Barber brand liquid asphalt-A. *See* Positive seal priming.

Barber liquid lap cement may be transported on steamers carrying passengers in the usual manner; that is, the can containing the liquid lap cement being inclosed in a roll of roofing paper. (Ruling, April, 1918.)

Barium binoxide may be transported on steamers carrying passengers, providing that it be packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, and with the further provision that it shall not be stored in place containing combustible materials. Furthermore, such drums should be plainly marked showing that the material that is contained therein is inflammable and must be stored in a place where there is no combustible material. (Ruling, October, 1914.)

Barrels and drums, empty. *See* Empty gasoline receptacles.

Barrett Manufacturing Co.'s roofing cement, having a flash point of not less than 239° F. and a fire point of not less than 239° F., may be transported on steamers carrying passengers. (Ruling, November, 1915.)

B-B-Cide, steamship grade, submitted by the Holmes Chemical Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, May, 1921.)

Bedola may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, September, 1920.)

Best of all metal polish, manufactured by the Essex Paint & Chemical Co., Essex, Conn., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1926.)

Bestovall cream metal polish and Bestovall paste metal polish, manufactured by the Bestovall Co., Stapleton, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1925.)

Bestovall furniture and auto body polish, manufactured by the Bestovall Co., Stapleton, N. Y., may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1925.)

Benzene sulphonyl chloride may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Benzine shall not be carried on passenger vessels as stores or cargo. (R. S.)

Benzole shall not be carried on passenger vessels as stores or cargo. (R. S.)

Besto sweeping compound may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (76683.)

Betanaphthol benzoate may be transported on steamers carrying passengers, if packed in good containers of glass or metal. (Ruling, July, 1918.)

Bichromate of potash (potassium bi- or di-chromate) may be transported on steamers carrying passengers, without restriction, when carried as a deck load and packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 800 pounds. (Ruling, April, 1922.)

Bird & Son (Inc.) roofing cement may be transported on steamers carrying passengers, when carried in absolutely tight containers. (Ruling, December, 1920.)

Bituminous solution. *See* Positive seal priming.

Black Bull liquid cement may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, June, 1922.)

Black Flag liquid spray may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, December, 1927.)

Black oil dye, shoe dye, manufactured by the American Shoe Polish Co., shall not be transported on steamers carrying passengers. (Ruling, November, 1926.)

Black roof paint. *See* Positive seal priming.

Blasting oil. *See* Nitroglycerin.

Blaugas can be carried on steamers carrying passengers, provided it is transported in cylinders that comply in all respects with the regulations prescribed by the Interstate Commerce Commission for the transportation of such articles by rail. (Ruling, May, 1915.)

Bleach. *See* Liquid bleach and caustic bleach.

Bliss exterminator, bedbug liquid, may be carried on steamers carrying passengers but shall not be carried as stores on passenger or pleasure steamers. (76383.)

Bliss vermicide, manufactured by the Bliss Disinfecting Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, October, 1921.)

Blue ribbon cream metal polish, manufactured by the International Metal Polish Co., Indianapolis, Ind., which flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers, and it shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Blue ribbon metal polish shall not be carried on passenger steamers as stores or cargo. (Ruling, August, 1915.)

Blue ribbon paste metal polish, manufactured by the International Metal Polish Co., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1926.)

Boiler and stack paint. *See* Positive seal priming.

Borsum's Putz liquid polish may be transported on steamers carrying passengers, when properly packed in metallic cases. "Metallic cases" refer to inner, not outer, packages. (49473.)

Boyce-ite, manufactured by the Boyce & Veeder Co. (Inc.), Long Island City, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1925.)

Brasbrite metal polish shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Bras-Brite polish, noninflammable. *See* Noninflammable bras-brite polish.

Brilliant shine metal polish, manufactured by E. W. Bennett & Co., San Francisco, Calif., which flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Brilliantshine metal polish, with flash point of 40° F., shall not be carried on passenger steamers as stores or cargo. (Ruling, June, 1912.)

Briquets, made from wood charcoal with starch and water for a binder and which have been stored not less than seven days after drying before loading in car, when packed in bags or barrels, may be transported on steamers carrying passengers. (Ruling, December, 1925.)

Bromine shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1913.)

Bromoform may be transported on steamers carrying passengers, when shipped in absolutely tight containers. (Ruling, November, 1920.)

Bronze powders may be transported on steamers carrying passengers, provided they are packed in hermetically sealed zinc-lined packages, or in packages properly lined with tin plate or terneplate. (Ruling, April, 1915.)

Bronzing liquid varnish No. 3 shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Brown Laboratories metal polish. *See* Metal polish, Brown Laboratories.

Buck brand metal polish shall not be carried on passenger steamers as stores or cargo. (Ruling, December, 1915.)

Burnshine metal polish, manufactured by J. C. Paul & Co., Chicago, Ill., which flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Bush's Monibak brilliant and Bush's Monibak metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, September, 1915.)

Butyl alcohol may be transported on steamers carrying passengers, provided it is not stowed in a hot place and is so packed as to prevent leakage. (Ruling, August, 1927.)

Cadmium nitrate may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Calcium bisulphite may be transported on steamers carrying passengers, when contained in strong water-tight metal receptacles or in strong water-tight barrels, such as wine or whisky barrels, and shall be stowed on deck. (Ruling, January, 1921.)

Calcium carbide may be transported on steamers carrying passengers, when contained in steel drums or steel receptacles, the seams of which are lapped and properly riveted or fastened in such manner as will best insure the maximum strength of the joints, and when the said drums or receptacles shall be water-tight and air-tight during such transportation. For packages of 110 pounds or less, such drums or receptacles shall be made of open-hearth steel of not less than No. 26 gauge. For packages of more than 110 pounds, such drums and receptacles shall be made of not less than No. 24 gauge: *Provided*, That said calcium carbide or carbide of calcium may also be transported on steamers carrying passengers in cans containing not more than 10 pounds of said calcium carbide or carbide of calcium each, such cans to be constructed and packed as follows: Said cans shall be made of 90-pound basis tin or terneplate, shall have double and lapped seams, shall have the openings in the tops fitted with tight compression caps, shall be constructed so as to render them water-tight and air-tight, and shall be packed in substantial wooden cases with not more than 60 pounds total weight of calcium carbide or carbide of calcium in each of such cases. (Rulings, February, 1907, and April, 1919, file 76796.)

Calcium chloride. *See* Lime.

Calcium cyanamide, unhydrated, shall not be carried as stores or cargo on passenger vessels. (Ruling, July, 1912.)

Calcium phosphide may be transported on steamers carrying passengers, in quantities of 1 pound when packed in glass bottles inclosed in tin, but larger quantities in bulk are forbidden. (Ruling, May, 1920.)

Calorene may be transported on steamers carrying passengers, when contained in cylinders that comply in all respects with the requirements of the Interstate Commerce Commission for the transportation of such articles by rail. (Ruling, January, 1921.)

Camphene shall not be carried on passenger vessels as stores or cargo. (R. S.)

Caps, percussion. *See* Percussion caps.

Carbacide may be transported on steamers carrying passengers, under the same conditions as refined petroleum and, if desired, may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Carbohydrogen gas may be transported on steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, July, 1919.)

Carbolacene, a liquid cleanser disinfectant, manufactured by the Carbolacene Co. of America (Inc.), New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1925.)

Carbolic acid or phenol is not limited as to amount permitted as a deck load on steamers carrying passengers, provided it is packed according to the quantity, in iron drums, or in water-tight tin cans which are inclosed in strong wooden cases, but in mixed shipments of drugs or chemicals not more than five 1-pound bottles or the same quantity in water-tight tin cans shall be permitted to be packed in a single case. (Ruling, December, 1919.)

Carbolicol wood preserver may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1922.)

Carbon bisulphide shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1917.)

Carbon black may be transported on steamers carrying passengers, provided it is cool when packed and is packed in tight containers. (Ruling, April, 1924.)

Carbonic-acid gas is not prohibited to be transported on steamers carrying passengers, under section 4472, Revised Statutes. It is suggested, however, that precaution is taken to see that the cylinders containing this article are stowed in a safe, cool place. (Letter, April 26, 1915.)

Carbonic gas, liquid, is a dangerous article to be transported but is not such a like dangerous article as is contemplated in section 4472, Revised Statutes, and, therefore, its carriage as freight and use as stores on steamers carrying passengers is not prohibited by section 4472, Revised Statutes. This commodity may, therefore, be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the regulations of the Interstate Commerce Commission. (Ruling, June, 1923.)

Carbon tetrachloride may be transported and used as stores on steamers carrying passengers. (Ruling, January, 1916.)

Cartridges come under the category of gunpowder and may be carried to continental Europe only on vessels that do not carry immigrants. (Ruling, December, 1909.) *See also* Ammunition, small arms.

Cash register cabinet polish, manufactured by the National Cash Register Co., Dayton, Ohio, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, January, 1924.)

Caustic soda. *See* Liquid bleach.

Celluloid. *See* Nitrocellulose products.

Celluloid cement, manufactured by the Celluloid Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, October, 1924.)

Cement paint for roofing paper, manufactured by the Paraffine Co. (Inc.), San Francisco, Calif., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, January, 1928.)

Cement paint, manufactured by the Paraffine Co. (Inc.), San Francisco, Calif., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1920.)

Certain-teed Products Corporation roofing cement may be transported on steamers carrying passengers. (Ruling, August, 1917.)

Charcoal, powdered, may be accepted for transportation in bottles containing 1 pound or less and in lots of not over 5 bottles in cases with other chemicals, when carefully packed. In separate cases it may be accepted in quantities of less than 25 pounds if securely packed. (40256.)

Charcoal wood, briquets. *See* Briquets.

Chemo insect and germ destroyer, manufactured by the Chemo Co., Buffalo, N. Y., may be transported on steamers carrying passengers, but shall not be used as stores on pleasure or passenger vessels. (Ruling, January, 1927.)

Cherry brighten-up stain may be transported on steamers carrying passengers, under the same conditions as turpentine; that is, that it be packed in good metallic vessels or casks or barrels, well and securely bound with iron, and stowed in a secure part of the vessel and marked with name. (Ruling, May, 1923.)

China wood oil, such as submitted by Arnhold, Karberg & Co., 21–24 State Street, New York, N. Y., is not a dangerous article as contemplated by section 4472, Revised Statutes, and may be transported on steamers carrying passengers. (Ruling, August, 1914.)

Chloracetic acid may be transported on steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, August, 1927.)

Chlorate of potassium. *See* Potassium chlorate.

Chloride, ethyl and methyl. *See* Ethyl chloride and methyl chloride.

Chloride of lime may be transported on steamers carrying passengers. (Ruling, February, 1917.)

Chlorine gas, liquid, shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1918.)

Chloroform may be transported on steamers carrying passengers. (Ruling, November, 1918.)

Chromic acid may not be accepted for transportation on steamers carrying passengers, except on the decks or guards thereof, or in such other safe part of the vessel as shall be prescribed by the inspectors. (Ruling, January, 1919.)

Citric acid is not inflammable nor seriously corrosive and may be accepted for transportation when properly packed in quantities up to 10 pounds, and in the same case with other chemicals when carefully packed and cushioned and inclosed in bottles not over 1 pound and not more than five bottles in one case. (40256.)

Clenopine may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Clorizol, submitted by the United States Sanitary Specialties Corporation, Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Coal oil shall not be carried on passenger vessels as cargo or stores. (R. S.)

Coal tar, Fuller genuine, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1927.)

Collodion shall not be carried on passenger vessels as stores or cargo. (40256.)

Colorite, manufactured by Carpenter-Morton Co., Boston, Mass., shall not be transported on steamers carrying passengers. (Ruling, March, 1921.)

Columbia insecticide (powder) may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Compasses (using gasoline and similar liquids) may be used with safety on steamers carrying passengers. (Ruling, October, 1915.)

Comstock polishing paste may be transported on steamers carrying passengers, without restriction. (Ruling, October, 1921.)

Converse mineral paste, silver polish, manufactured by W. W. Converse & Co., Palmer, Mass., may be transported on steamers carrying passengers without restriction and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1925.)

Copper paint shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Copper paint, manufactured by the Baltimore Copper Paint Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1922.)

Corn oil is not a dangerous article within the contemplation of section 4472, Revised Statutes, and may, therefore, be transported on steamers carrying passengers. (Ruling, September, 1914.)

Coro-noleum may be used as stores on passenger or pleasure steamers. (Ruling, February, 1916.)

Co-Speco glass wonder, manufactured by the Consolidated Specialties Co., New Bedford, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1923.)

Cotton, baled, shall be securely bound and covered with bagging on at least three-fourths of its surface, including both ends of the bale. (S. I. S. General Rules and Regulations, April 8, 1918, p. 136.)

Cotton, loose or in poorly compressed and uncovered bales, shall not be carried on passenger vessels as cargo or stores. (R. S.)

Cotton, unginned sea-island, raised in Porto Rico, contained in jute bags and compressed, may lawfully be carried on passenger steamers. (Ruling, June, 1911.)

Cottonseed oil. *See* Residuum of cottonseed oil.

Cotton sweepings may be transported under the same conditions as cotton; that is, in properly covered and compressed bales. (62812.)

Crenoid may be transported on steamers carrying passengers, under the same conditions as turpentine. (Ruling, June, 1916.)

Crelol disinfectant, manufactured by the White Tar Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1925.)

Cremo metal polish may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger steamers. (Ruling, November, 1917.)

Creoline, a disinfectant, may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1927.)

Creolol, a disinfectant, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (December, 1921.)

Creosote may be transported on steamers carrying passengers when in bottles of 1 pound contents or less and in lots of five bottles or less in a single case, with or without other chemicals, when carefully packed. (40256.)

Creosote oil, lumber, piling, telegraph cross-arms, posts, ties, and paving blocks, wholly or partially treated or impregnated with creosote oil, and creosoted stained shingles may be transported on steamers carrying passengers. (Ruling, June, 1921; also, see ruling under Holder.)

Cresol may be permitted as a deck load on steamers carrying passengers, provided it is packed according to quantity in iron drums or in water-tight tin cans which are inclosed in strong wooden cases. (Ruling, April, 1914.)

Cyanide may be transported in small quantities on steamers carrying passengers, if packed in sealed tin containers and properly boxed. The cyanide should not be placed with other chemicals in mixed shipments. Large quantities of cyanide may be carried in iron drums on deck. (Ruling, July, 1918.)

Cyanide tank paint shall not be carried on passenger vessels as stores or cargo. (62906.)

Cylinder oil No. 45, high pressure, 600° test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Cylinder stock oil, 545° fire test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Cylinders, empty. *See* Empty gasoline receptacles.

Dandee automobile nickel polish, manufactured by the Dandee Manufacturing Co., Cleveland, Ohio, may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

De-Germ, an insecticide, manufactured by the Century Chemical Products Co., Detroit, Mich., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Deth-to-bugs, manufactured by the Nudru Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1923.)

Detonators containing fulminate of mercury shall not be carried on passenger vessels as stores or cargo. (Ruling, July, 1911.)

De Vry motion-picture projectors, types E and U, are approved for use on passenger and other vessels under the jurisdiction of the Steamboat Inspection Service, subject to the requirements of this service in connection with the installation of the projectors and the storing of the films. The slow-burning (acetate cellulose) and the inflammable (nitrocellulose) films for these projectors may be used in the booths. (Ruling, April, 1921.)

Dinitrochlorobenzene may be transported on steamers carrying passengers, when packed in tight metal containers. (Ruling, April, 1924.)

Dinitrochlorobenzol may be transported on steamers carrying passengers, when packed in tight metal containers. (Ruling, April, 1924.)

Dinitrophenol shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1917.)

Disinfectant hypozone may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, April, 1916.)

Disinfectants containing prohibited articles should not be accepted if the flash point is below 110° F. with the closed cup. Such substances flashing above 110° F. may be accepted in bottles of 1 pound or less, carefully packed and inclosed in sealed metallic containers, with not more than 5 pounds in a single container. Not more than 1 pound in a sealed metallic container should be allowed in cases containing other chemicals. (40256.)

Dixie metal polish, Special No. 2, may be used under the provisions of section 5, Rule X, General Rules and Regulations, as stores on any pleasure or passenger steamer. (Ruling, October, 1911.)

Dixie special metal polish shall not be carried on passenger steamers as stores or cargo. (Ruling, August, 1911.)

Dolomite, composed of magnesia and unslaked lime, shall not be carried as stores or cargo on passenger vessels. (Ruling, August, 1915.)

Donovan's solution. *See* Arsenic compounds.

D. O. R. Powder deodorizer, manufactured by the D. O. R. Powder Works, Brooklyn, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1925.)

Dorsey metal polishing cloth may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers when care is taken to store it in a cool place. (Ruling, February, 1915.)

Dragon brand metal polish, manufactured by J. C. Paul Co., Chicago, Ill., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1925.)

Dragon's blood powder, manufactured by R. Mohr & Sons, San Francisco, Calif., may be transported on steamers carrying passengers, without restriction. (Ruling, June, 1926.)

Dross. *See* Lead dross.

Drums, empty. *See* Empty gasoline receptacles.

Duco paint, white. *See* White duco paint.

Duke's nonburnable metal polish, manufactured by the Jasam Manufacturing Co., Seattle, Wash., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, February, 1914.)

Dupont thinners Nos. 3601 and 3514, lacquer thinner, shall not be transported on steamers carrying passengers. (Ruling, July, 1927.)

Dutch Brand rubber cement and Dutch Brand gasket shellac compound shall not be transported on steamers carrying passengers. (Ruling, January, 1926.)

Dynamite shall not be carried on passenger vessels as stores or cargo. (R. S.)

Dynamo oil, 400° fire test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Eaco metal polish shall not be used as stores on passenger or pleasure steamers and shall not be transported on such steamers. (Ruling, February, 1916.)

E. & R. liquid cream metal polish may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1922.)

Ebonol may be transported on steamers carrying passengers, under the same restrictions as refined petroleum. (Ruling, May, 1922.)

Ebonol reducer shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Economy Lubricating Co. metal polish. *See* Noninflammable, noncombustible, nonexplosive metal polish.

Electric-blasting caps shall not be carried on steamers carrying passengers. (Ruling, October, 1912.)

Electric squibs may be transported on steamers carrying passengers, if stowed in the magazine of the steamer. (76824.)

Electrolyte may be transported on steamers carrying passengers, under the same conditions as sulphuric acid. (Ruling, October, 1915.)

Empty gasoline receptacles that have been filled with gasoline may be transported on steamers carrying passengers, provided they have been fully drained and steamed out, due care being taken to ascertain that the steaming is so thoroughly done that there will be no possibility of accumulation of gases. (Ruling, February, 1916.)

Emulsion disinfectant may be used as stores on passenger or pleasure steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Enamel leather dressing shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Enoz moth liquid, manufactured by the Enoz Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1922.)

Enoz moth liquid, special, manufactured by the Enoz Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, November, 1922.)

Ether shall not be carried on passenger vessels as stores or cargo; only supply for anesthetic purposes may be carried. (Ruling, September, 1912.)

Ethereal antiseptic soap shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1913.)

Ethyl acetate, or acetic ether, shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1918.)

Ethyl bromide shall not be carried on passenger vessels as stores or cargo. (70078–71.)

Ethyl chloride shall not be carried on passenger vessels as stores or cargo. (Ruling, May, 1917.)

Ethylene may be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the requirements of the Interstate Commerce Commission, care being taken to see that they are stowed on deck. (Ruling, May, 1927.)

Eucadola may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, September, 1920.)

Eureka metal polish, manufactured by the George Williams Co., Cleveland, Ohio, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1924.)

Explosives shall not be carried on passenger vessels as stores or cargo. (Sec. 232, act of March 4, 1909.)

Ferric chloride. *See* Perchloride.

Ferrophosphorus shall not be transported on steamers carrying passengers. (Ruling, October, 1924.)

Ferrosilicon in any form shall not be carried on passenger vessels as cargo or stores. (Ruling, February, 1912.)

Fibreloid. *See* Nitrocellulose products.

Filmo motion-picture projector is approved for use on vessels under the jurisdiction of the Steamboat Inspection Service when using only the 16-millimeter Eastman safety standard slow-burning film. A booth is not required for this projector. (Ruling, June, 1925.)

Films of kodaks and other cameras may be transported on steamers carrying passengers, when packed in the following manner: Each spool or dozen sheets wrapped in foil and individual cartons then packed in wooden boxes or in strong fiber boxes, properly sealed. (Ruling, November, 1919.)

Films, moving-picture. *See* Moving-picture films.

Fireproof dustless sweeping compound may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1922.)

Fireproof dustless sweeping compound, manufactured by the National Sawdust Co., Brooklyn, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1924.)

Firestone hold fast patch stock, manufactured by the Firestone Tire & Rubber Co., Akron, Ohio, shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1923.)

Fireworks; common fireworks may be transported on steamers carrying passengers, provided that they are stowed in safe places, but not in the lower hold. Special fireworks may be carried on steamers carrying passengers, when stowed in the magazine of the ship or when carried on the open deck. (Ruling, September, 1915.)

Fiske's marine auxiliary illuminating oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, April, 1916.)

Flit, an insecticide, manufactured by the Standard Oil Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1924.)

Flux. *See* Trinidad flux.

Flyosan, an insecticide, manufactured by the Colonial Chemical Corporation, Reading, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1920.)

Formaldehyde may be transported on steamers carrying passengers. (Ruling, November, 1918.)

Fowler's solution. *See* Arsenic compounds.

Frank Miller's metal polish may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, November, 1917.)

Freezone corn cure shall not be transported on steamers carrying passengers. (Ruling, November, 1921.)

French's metal polish, the kind submitted by A. H. D. French, Malden, Mass., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1915.)

Frencholina, a disinfectant, may be transported on steamers carrying passengers, care being taken to ship it in the usual manner followed by the trade. (Ruling, November, 1918.)

Frierson's fly driver and mosquito exterminator may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1921.)

Fuller genuine coal tar. *See* Coal tar.

Fulminate, dry, in bulk, shall not be carried on passenger vessels as stores or cargo. (Ruling, June, 1910.)

Fulminate of mercury, in detonators. *See* Detonators.

Fuming sulphuric acid. *See* Sulphuric acid.

Fuse, safety, which consists of a core of granular black powder which is surrounded by yarn, tape, pitch, rubber, etc., may be carried without restriction on steamers carrying passengers. Safety fuses of this kind should be packed in strong wooden boxes, barrels, or other secure packages properly marked. (Ruling, June, 1919.)

Fuses may be transported on steamers carrying passengers, under the same conditions as gunpowder. (65297.)

Fuses, electric, shall not be carried on passenger vessels as stores or cargo. (Ruling, May, 1910.)

Fuses, electric, except those containing fulminate of mercury, may be treated as gunpowder or small-arms ammunition and may be transported on steamers carrying passengers, under the provisions of section 4472, Revised Statutes. (Ruling, April, 1910.) This does not apply to emigrant vessels. (40257.)

Fuses for shrapnel shells shall not be carried on passenger vessels as stores or cargo. (Ruling, July, 1915.)

Galena-Marine signal oil may be used as stores on passenger or pleasure steamers and may be transported on steamers carrying passengers. (Ruling, April, 1916.)

Gas can not be manufactured or used for illuminating purposes on passenger vessels. (Ruling, February, 1912.)

Gasket shellac compound, Dutch Brand, submitted by Van Cleef Bros., Chicago, Ill., shall not be transported on steamers carrying passengers. (Ruling, January, 1926.)

Gas Oil, manufactured by the Standard Oil Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1927.)

Gas Oil, as submitted by Wessel, Duval & Co., New York, N. Y., having a flash point of 266° F., and a fire point of 304° F., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, November, 1922.)

Gasoil, manufactured by the Crown Central Oil Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1926.)

Gasoline is not allowed, under section 4472, Revised Statutes, to be carried as stores on steamers carrying passengers. (Ruling, October, 1912.)

Gasoline engine; it is unlawful to use a gasoline engine to drive an electric generator on board a pleasure steamer subject to inspection. (Ruling, August, 1913.)

Genasco asphalt putty shall not be transported on steamers carrying passengers. (Ruling, January, 1919.)

Genasco asphaltum varnish structural paint. *See* Positive seal priming.

Genasco metal preservative may be transported on steamers carrying passengers, it being understood that it be packed in tin cans ranging from 1 to 10 gallons each, which are in turn incased in a wooden box containing 1 to 2 cans per case, and that, in addition to packing the material in tin cans, it is also packed at times in double-head hardwood barrels of 30 and 50 gallons capacity, as well as in steel drums having a capacity of 50 gallons. (Ruling, April, 1918.)

Genasco roof coating may be transported on steamers carrying passengers, it being understood that it will be packed in tins ranging from 1 to 10 gallons each, which are in turn incased in a wooden box containing 1 to 2 cans per case, and that, in addition to packing the material in tin cans, it is also packed at times in double-head hardwood barrels of 30 and 50 gallons capacity, as well as in steel drums having a capacity of 50 gallons. (Ruling, April, 1918.)

General Roofing Co.'s roofing cement, having a flash point of not less than 239° F. and fire point of not less than 253.4° F., may be transported on steamers carrying passengers. (Ruling, April, 1915.)

Glacial acetic acid may be transported on deck on steamers carrying passengers. (Ruling, October, 1915.)

Gliddenite metal polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1917.)

Glidden's metal polish shall not be transported on steamers carrying passengers or be used as stores on passenger or pleasure steamers. (Ruling, October, 1917.)

Glynoin oil. *See* Nitroglycerin.

Goodrich rubber cement shall not be transported on steamers carrying passengers. (Ruling, December, 1921.)

Goodyear tube repair kit. *See* Tube repair kit.

Grady's liquid scouree polish shall not be used as stores on passenger or pleasure steamers and shall not be transported on steamers carrying passengers. (Ruling, November, 1916.)

Grady's marvelous metal cleaner and polish, manufactured by the Grady Mfg. Co., Long Island City, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1926.)

Grady's scource, manufactured by the Grady Mfg. Co., Long Island City, N. Y., may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1926.)

Grady's scouree polish in paste form may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Graphoscope Junior and Graphoscope Portmanto motion-picture projectors may be installed on steamers carrying passengers under the jurisdiction of the Steamboat Inspection Service, when installed in booths constructed in accordance with the specifications that have heretofore been adopted (see Bulletin No. 67). These projectors are allowed to use either acetate cellulose or nitrocellulose films. (Ruling, August, 1921.)

Graphoscope moving-picture machine shall not be used on steamers carrying passengers. (Ruling, September, 1916.)

Gunpowder shall not be carried on passenger vessels as stores or cargo. Restriction applies to all common carriers carrying passengers. For ruling and exceptions thereto, see section 232, act of March 4, 1909, page 180. Carried in passenger vessels only under special license. (R. S.)

Handcraft stains, fumed oak, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Hanite, explosive, shall not be carried on passenger vessels as stores or cargo. (Ruling, February, 1912.)

Hat Brite, gloss black, coloring solution, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Hay, loose, shall not be carried on passenger vessels as stores or cargo. (R. S.)

Heaney's marine metal polish may be used as stores on passenger or pleasure steamers and may be transported on passenger steamers. (Ruling, April, 1916.)

Heaney's metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1915.)

Heller's golden shine metal polish shall not be transported on steamers carrying passengers or used as stores on passenger or pleasure steamers. (Ruling, June, 1917.)

Hemp; no bales of imported or domestic hemp shall be received on any vessel carrying passengers, unless the same are properly compressed, bound with rope, wire, or metallic bands, and covered on ends or sides, according to the several methods now practiced in foreign and domestic trade. (Sec. 4472, R. S.)

Hemp, loose or in poorly compressed and covered bales, shall not be carried on passenger vessels as stores or cargo. (R. S.)

High explosives on motor boats; while there is no law that prohibits the transportation of dangerous articles on motor boats of any class, this bureau considers it highly imprudent and very indiscreet to carry high explosives or dangerous articles of any character on any vessel that carries passengers for hire. (Ruling, January 3, 1919, file 34040.)

High light lacquer shall not be carried on passenger vessels as stores or cargo. (70078–50.)

Hindu Wizard, a liquid insecticide, manufactured by the East Indian Chemical Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1926.)

Hirshe Manufacturing Co. metal polish, as submitted August 14, 1913, may be transported on steamers carrying passengers under the same conditions as refined petroleum, upon routes where there is no other practical mode of transporting the same, but the polish can not be used as stores on any pleasure or passenger steamer. (Ruling, October, 1913.) As submitted October 3, 1913, it may be used as stores on pleasure or passenger steamers. (Ruling October, 1913.)

Holder or creosote oil, having a fire point of not less than 110° F., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1920.)

Holmes motion-picture projector is approved for use on vessels under the jurisdiction of this service only when operated within the approved booths (see Bulletin No. 67 and as amended in bulletin of January 2, 1923). In this projector the inflammable (nitrocellulose) film, with a light of not over 1,000 watts capacity, and the slow-burning (acetate cellulose) film may be used. (Ruling, November, 1923.)

Horsford's acid phosphate may be transported on steamers carrying passengers. (Ruling, October, 1918.)

Hoynesite, an explosive, may be transported on steamers carrying passengers, under the same conditions as gunpowder. (Ruling, August, 1921.)

Hutch-Olene, a gasoline intensifier, manufactured by the Hutch-Olene Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, February, 1925.)

H. W. Johns-Manville Co.'s roofing cement may be transported on steamers carrying passengers, if carried in absolutely tight containers. (Ruling, July, 1920.)

Hydrochloric acid may be transported on steamers carrying passengers, under the same conditions as sulphuric acid. (Ruling, October, 1918.)

Hydrocyanic acid; the usual 2 per cent solution may be accepted for transportation in 1-pound bottles, and in lots of five or less bottles if properly protected against breakage and surrounded by a satisfactory absorbent and the whole inclosed in a tight metallic container. Each individual package and the container should be marked with the name and the word "Poison." Hydrocyanic acid so packed may be packed with other chemicals in the same case, which should be marked "Poison." (40256.)

Hydrogen gas shall not be transported on steamers carrying passengers. (Ruling, September, 1921.)

I. C. U. metal polish and I. C. U. nickel polish shall not be carried as stores or cargo on passenger steamers. (Ruling, September, 1914.)

Ignition powder may only be transported on passenger steamers, under the same conditions as gunpowder. (70078–2.)

Illuminating gas. *See* Gas.

Inland Lake metal polish, manufactured by George B. Carpenter & Co., Chicago, Ill., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1923.)

Insecticide, submitted by C. S. Jones, Detroit, Mich., for exterminating bedbugs and roaches, may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1924.)

Insecticide, manufactured by the Tanglefoot Co., Grand Rapids, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1927.)

Insecticides containing prohibited articles are subject to the same restrictions as disinfectants. (40256.)

Instant sanitary cleanser, submitted by the Globe Chemical Co., being noninflammable, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

International roofing cement shall not be transported on steamers carrying passengers. (Ruling, March, 1917.)

Ishine powder and liquid metal polish, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1922.)

Isolite. *See* Pintsch gas.

Izen, used to prevent rust and tarnish on metallic surfaces, manufactured by the Alaco Products Sales Corporation, Jersey City, N. J., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, February, 1924.)

Japan drier may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

J–M liquid lap cement may be transported on steamers carrying passengers. (Ruling, April, 1917.)

J. M. liquid roof coating shall not be transported on steamers carrying passengers. (Ruling, April, 1917.)

J–M steep roofing cement may be transported on steamers carrying passengers. (Ruling, April, 1917.)

J–O bug-roach powder may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure vessels. (Ruling, April, 1916.)

J–O roach and rat paste may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure vessels. (Ruling, April, 1916.)

Johns-Manville Co. roofing cement. *See* H. W. Johns-Manville Co.

Justrite spirits may be transported on steamers carrying passengers, under the same condition as turpentine. (Ruling, July, 1911.)

Kanite shall not be carried on passenger vessels as stores or cargo. (Ruling, February, 1912.)

Kemoshyne auto body polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it, but it shall not be used as stores on passenger and pleasure steamers. (Ruling, November, 1914.)

Kemoshyne metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, November, 1914.)

Kerosene. *See* Oils, illuminating.

Kilall, an insecticide, germicide, deodorant, and cleanser, submitted by W. H. and F. Jordan, jr., Mfg. Co., Philadelphia, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it is not to be used as stores on pleasure or passenger vessels. (Ruling, April, 1922.)

Kil-Bug, manufactured by the West Disinfecting Co., Washington, D. C., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1920.)

Kiltik cattle dip may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

Kilzum insecticide may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, June, 1915.)

King's metal polish may be carried as stores on pleasure steamers or steamers carrying passengers if it has a fire point of more than 300° F. (Ruling, August, 1911.)

King's steamboat polish shall not be carried as stores on passenger steamers. (Ruling, August, 1911.)

Kleanco polishing preparation may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, December, 1919.)

Knox-Tarnish, manufactured by the Dolphin Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, August, 1926.)

Kodalak shall not be transported on steamers carrying passengers. (Ruling, April, 1925.)

Kolfene, a disinfectant, submitted by the United States Sanitary Specialties Corporation, Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Kramer cream metal polish marked "Inflammable" shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger steamers. (Ruling, April, 1924.)

Kramer cream metal polish marked "Noninflammable" may be transported on steamers under the same conditions as refined petroleum and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1924.)

Kreso, manufactured by Parke Davis & Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure vessels. (Ruling, July, 1921.)

Kwyk metal polish may be used as stores on pleasure or passenger steamers, and may be transported on steamers carrying passengers. (Ruling, April, 1916.)

Lactic acid may be transported on steamers carrying passengers. (Ruling, December, 1918.)

Lacquer shall not be transported on steamers carrying passengers. (Ruling, April, 1925.)

Lacquer marked "Duco-Dupont, Japanese Blue, and Green" shall not be transported on steamers carrying passengers. (Ruling, July, 1927.)

Lacquer thinner. *See* Dupont thinner Nos. 3601 and 3514.

Lampblack may be transported on steamers carrying passengers, provided the said commodity is cool when packed and is packed in tight containers. (Ruling, April, 1924.)

Lead arsenate. *See* Arsenic compounds.

Lead dross and type dross, consisting of metal oxides mingled with particles of metal, are not inflammable or explosive, and the only conceivable risk would be the evolution of small amounts of the inflammable and poisonous gases, arsine and stibine, which might be formed by the action of strong acids upon metallic particles. The department further states that it has been informed that waste material from sulphuric acid tanks is also called lead dross, and that there can be no question that this is dangerous and should not be offered for shipment. (Ruling, April, 1914.)

Lead dross or waste material from sulphuric acid tanks does not include lead dross or type dross, consisting of metal oxides mingled with particles of metal, and shall not be carried on passenger vessels as stores or cargo. (63086 and 63412.)

Liberty polish, a metal polish, manufactured by the Scranton Chemical Co., Scranton, Pa., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1927.)

Lightning metal polish, manufactured by the Century Chemical Products Co., Detroit, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Lime, hydrated or slaked, may be transported in bags, properly marked with name, on steamers carrying passengers. (Ruling, July, 1910.)

Lime, unhydrated, or quicklime may be transported on steamers carrying passengers, when contained in strong, water-tight metal receptacles or in strong, heavy, water-tight barrels, such as wine or whisky barrels, and shall be stowed on deck. (Ruling, April, 1917.)

Lime sulphur solution may be transported on steamers carrying passengers, when properly stowed. (Ruling, June, 1926.)

Linseed oil is not a dangerous article as contemplated by section 4472, Revised Statutes, and it may be transported upon steamers carrying passengers. (Ruling, November, 1911.)

Liquid bleach and caustic soda may be transported on steamers carrying passengers. Liquid bleach should be packed in suitable water-tight containers, and caustic soda, which is ordinary concentrated lye, may be packed in tight metal containers, or even in glass bottles, which are properly packed to prevent excessive danger of breaking. (Ruling, October, 1916.)

Liquid cream metal polish, manufactured by Joseph Wachtel, Cleveland, Ohio, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Liquid imperial metal polish shall not be used as stores on passenger steamers. (Ruling, August, 1916.)

Liquid lap cement may be transported on steamers carrying passengers. (Ruling, January, 1918.)

Liquid metal polish, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1922.)

Locktite tire patch outfits, manufactured by the Locktite Patch Co., Detroit, Mich., may be transported on steamers carrying passengers, under the same conditions as rubber cements; that is, on deck, covered over, convenient for jettison in case of emergency, or if stowed in a properly constructed magazine safely removed from fire. (Bulletins, November 1, 1926, and January 3, 1927.)

Lunarine metal polish, manufactured by the Solarine Co., Baltimore, Md., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, January, 1928.)

Lustre Perino German metal polish may be used as stores on steamers carrying passengers. (Ruling, August, 1912.)

Luxo Flash powder may be transported on steamers carrying passengers, under the same conditions as gunpowder. (Ruling, June, 1915.)

Lye, concentrated. *See* Liquid bleach.

Lysol may be transported on steamers carrying passengers. Small quantities of lysol may be packed in mixed shipments of drugs and chemicals. Glass bottles up to ½ gallon capacity or tin cans up to 5 gallons containing lysol are safe if packed in suitable wooden cases. Where large quantities are carried it shall be stowed on deck where it may be easily jettisoned in case of necessity. (Ruling, June, 1918.)

Macomber wave oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, April, 1916.)

Magic cloths, manufactured by the Chapman Co., Kansas City, Mo., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Magnesium nitrate may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Magnolene signal oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, June, 1916.)

Malthoid cement paint may be transported on steamers carrying passengers. (Ruling, January, 1917.)

Manganese borates may be transported on steamers carrying passengers. (Ruling, May, 1915.)

Marine illuminating oil, Liberty Oil Co., New Orleans, La., may be used as stores on passenger or pleasure steamers and may be transported on such steamers. (Ruling, April, 1916.)

Marine illuminating oil "A" and "B," manufactured by the National Refining Co., Findlay, Ohio, may be used as stores on passenger or pleasure steamers. (Ruling, November, 1915.)

Marine illuminating oil "C" and "L" may be used as stores on passenger or pleasure steamers. (Ruling, February, 1916.)

Marine oil, No. 10, 400° test. *See* No. 10 Marine oil.

Marine Spray No. 9, manufactured by McCormick & Co. (Inc.), Baltimore, Md., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, October, 1927.)

Marvelac, orange, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Masurite, explosive, shall not be carried on passenger vessels as stores or cargo. (Ruling, October, 1911.)

Matches, so-called safety matches, which include the ordinary paper-book matches or strike-on-box matches, may be transported on steamers carrying passengers, when packed in strong outside containers either of wood or of proper fiber-board construction. (Ruling, March, 1923.) So-called strike-anywhere matches or friction-tip matches may be transported on steamers carrying passengers when meeting all the requirements of paragraph 1836 and container specification No. 6, as set forth in the regulations for the transportation of explosives and other dangerous articles by freight, and specifications for shipping containers as promulgated by the Interstate Commerce Commission. (Ruling, June, 1923.)

Menalitt powder shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1911.)

Mercuric chloride may be shipped in pound bottles, well cushioned, of not over 5-pound lots in the same case with other chemicals. In bulk of not more than 10 pounds the same should be shipped in wooden boxes and the case be marked plainly with the name and the word "Poison." (40256.)

Metal bronzes and polishes, general ruling: Metal bronzes and polishes containing prohibited articles should be subject to the same restrictions as disinfectants. (40256.) (See individual cases.)

Metallic sodium may be transported on steamers carrying passengers, providing it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn should be packed in water-tight metallic cases, securely boxed in a case of sufficient strength to withstand hard usage, and the case must never be stowed where water can reach it, whether from leaky pipes, spray, or in any other way; and it is also further provided that the case shall not be stowed in places containing combustible material. (Ruling, November, 1911.)

Metal polish, manufactured by Brown Laboratories, Woodhaven, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1927.)

Metal polish, manufactured by the Randall Products Corporation, Stapleton N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling August, 1927.)

Metal polishes unable to withstand fire test of 300° F. shall not be carried on steamers carrying passengers, as stores or cargo. (40256.) (See individua metal polishes.)

Metalustre metal polish may be transported under the same conditions as refined petroleum, on steamers carrying passengers upon routes where there is no other practicable mode of transporting it, but it may not be used as stores on passenger or pleasure steamers. (Ruling, June, 1914.)

Methyl acetone shall not be transported on steamers carrying passengers. (Ruling, January, 1925.)

Methyl chloride may be transported on steamers carrying passengers, when contained in cylinders that meet, in all respects, the requirements of the Interstate Commerce Commission, it being understood that each shipment of this commodity shall consist of not more than 10 of the 90-pound cylinders, and that these cylinders shall be carried on deck in an upright position, valves uppermost, and where they will not be exposed to direct sunlight or to artificial heat. (Ruling, March, 1927.)

Mexoline metal polish shall not be used as stores or carried as cargo on passenger or pleasure steamers. (69989–12.)

Miller's metal polish. *See* Frank Miller's metal polish.

Mill Spray, an insecticide, manufactured by the Perolin Co. of America, Detroit, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Mineral colza, sperm oil. *See* Oil, mineral colza, etc.

Mineral spirits, Fuller, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1927.)

Mirbane oil. *See* Mono-Nitro-Benzole.

Moco monkey-grip cement may be transported without restriction on steamers carrying passengers. (Ruling, July, 1920.)

Monogram shoe polish, manufactured by the Fulton Shoe Polish Co., New York, N. Y., may be transported on steamers carrying passengers, when contained in tins packed in well-nailed and iron-strapped wooden cases lined with waterproof paper and stowed in a secure part of the vessel. (Ruling, June, 1921.)

Mono-Nitro-Benzole, or mirbane oil, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1921.)

Morganbrite metal polish, manufactured by the Morgan Manufacturing Co., Newport, R. I., can not be carried on steamers carrying passengers nor used as stores on passenger or pleasure steamers. (Ruling, July, 1914.)

Morganbrite metal polish, with flash and fire point of below 338° F., shall not be carried as stores or cargo on passenger steamers. (Rulings, July, 1914, and April, 1915.)

Mosquito-bite cure and insect destroyer, manufactured by Sallade & Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1923.)

Motiograph De Luxe motion-picture projector may be used on vessels under the jurisdiction of this service, only when used within the approved booths (see Bulletins Nos. 67 and 87). Where a rheostat or transformer is used it must be suitably guarded. The inflammable (nitrocellulose) film or the slow-burning (acetate cellulose) film may be used. (Ruling, November, 1923.)

Motion-picture booths to be installed on passenger vessels must meet the requirements of the Steamboat Inspection Service as set forth in the specifications contained in Bulletin No. 67 for such booths installed prior to December, 1922, and in Bulletin No. 87 for booths installed subsequent to December, 1922. (Ruling, December, 1922.)

Motion-picture films; small piece of noninflammable or acetate cellulose film may be transported on steamers carrying passengers with each toy moving-picture machine of the Keystone Manufacturing Co., when the film is packed in tightly closed metal cases. (Ruling, June, 1924.)

Motion-picture films may be transported on steamers carrying passengers, under the same conditions as are laid down by the Interstate Commerce Commission with reference to packing and labeling of the same. (Ruling, April, 1917.)

Muriatic acid may be accepted for transportation under the same conditions as Sulphuric acid. (Ruling, June, 1915.) In addition, it may also be transported in the proper type of wooden barrels, properly lined with rubber, when these barrels conform in every respect with the requirements of the Interstate Commerce Commission as laid down in their shipping container specification No. 9. (Ruling, June, 1924.)

Murray's bedbug doom may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, July, 1916.)

Mustard gas shall not be transported on steamers carrying passengers. (Ruling, February, 1926.)

Naphtha shall not be carried as stores or cargo on passenger steamers. (R. S.)

Naphthalin crudum and naphthalin sublimatum may be transported on steamers carrying passengers, when packed in strong wooden barrels or casks. (Ruling, May, 1915.)

Naphtha soap; all so-called naphtha soaps may be transported on steamers carrying passengers, only when stowed on the open deck or in properly ventilated spaces on or above the main deck. (Ruling, June, 1914.)

National metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1916.)

National storm oil shall not be used as stores on steamers carrying passengers. (Ruling, January, 1916.)

Neponset roofing cement may be transported on steamers carrying passengers. (Ruling, July, 1916.)

Neptune Belt Cement, manufactured by the Graton & Knight Manufacturing Co., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger steamers. (Ruling, November, 1924.)

New Premier Pathescope safety standard motion-picture projector may be installed on steamers carrying passengers under the jurisdiction of the Steamboat Inspection Service, when installed in booths constructed in accordance with the specifications that have heretofore been adopted (see Bulletin No. 67.) This projector is allowed to use only acetate cellulose films. (Ruling, August, 1921.)

New Premier Pathescope motion-picture projector, with narrow-width, noninflammable (cellulose acetate) film, manufactured by the Pathescope Co. of America, may be used without a booth on steamers carrying passengers, subject to the inspection of this service. This ruling does not apply to the so-called Peerless motion-picture projector manufactured by the same company. (Ruling, October, 1922.)

Nitrate of ammonia is not a like dangerous article to those articles named in section 4472, Revised Statutes, and may be transported on steamers carrying passengers, provided it is specially stowed where it is readily accessible in case of fire. (Ruling, October, 1919.)

Nitrate of potash. *See* Saltpeter.

Nitrate of soda, in bags, boxes, or barrels, may be transported on steamers carrying passengers, provided it is specially stowed where it is readily accessible in case of fire and where there is no danger of contact with water. (Ruling, May, 1914.)

Nitrated oil, or powder or fiber mixed or saturated with same, shall not be carried on passenger steamers as stores or cargo. (R. S.)

Nitric acid may not be transported on steamers carrying passengers, except on the guards or on the decks thereof, or in such other safe parts of the vessel as shall be prescribed by the local inspectors. (Ruling, October, 1918.)

Nitrocellulose, wet with 20 per cent of water, may be transported on steamers carrying passengers, when packed in zinc containers hermetically sealed. (Ruling, December, 1913.)

Nitrocellulose products, the pyroxylin plastics, whether designated as celluloid, viscoloid, pyralin, fibreloid, xylonite, or otherwise, are not dangerous articles within the contemplation of section 4472, Revised Statutes, when their transportation is attended with care and their stowage and location in the ship attended with adequate precaution against fire. Sheets or other original forms of the above-mentioned articles, articles whose composition is more than 10 per cent thereof, or articles whose nitrocellulose attachments consist of more than 10 per cent of the aggregate weight of the article must be carried in places convenient of access—that is to say, in the deck houses or the upper between decks of ocean steamers, or on the covered main deck of lake, bay, sound, or river steamers—but articles whose composition or attachments are made up of less than 10 per cent of their weight of nitrocellulose products may be carried in any part of the ship remote from excessive heat. (Ruling, October, 1909.)

Nitrogen gas may be transported in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, September, 1922.)

Nitroglycerin, or powder or fiber mixed or saturated with same, shall not be carried on passenger steamers as stores or cargo. (R. S.)

Nitroleum, or powder or fiber mixed or saturated with same, shall not be carried as stores or cargo on steamers carrying passengers. (R. S.)

Nitrous-oxide gas may be transported on the decks of steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, August, 1918.)

Nitro Valspar, automobile varnish, shall not be transported on steamers carrying passengers. (Ruling, July, 1927.)

Nobugitol, an insecticide, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

No. 3 Patent-leather repairer shall not be transported on steamers carrying passengers. (Ruling, May, 1917.)

No. 10 Marine engine oil, 400° test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Nonexplosive metal polish, submitted by the Standard Oil Co., of San Francisco, Calif., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, January, 1925.)

Noninflammable Bras-Brite polish may be used as stores on passenger or pleasure steamers and may be transported on such steamers. (Ruling, May, 1916.)

Noninflammable metal polish, Geo. W. Hoffman Co., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, August, 1916.)

Noninflammable, noncombustible, nonexplosive metal polish, manufactured by the Economy Lubricating Co., Charlestown, Mass., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, August, 1915.)

Noskcaj mystic cleaner, manufactured by the Karbryte Commercial Polishes Co., San Francisco, Calif., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1924.)

Noxon Cleaner polish, manufactured by the Noxon Chemical Products Co., Newark, N. J., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1924.)

Noxon Universal cleaner-polish, manufactured by the Noxon Chemical Products Co., Newark, N. J., may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, May, 1921.)

Nugas, a product put on the market by the Nugas Corporation, of Greenwich, Conn., may be transported on steamers carrying passengers when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, May, 1924.)

Nujol, manufactured by the Standard Oil Co. of New Jersey, does not come within the prohibitions of section 4472, Revised Statutes. (Ruling, September, 1915.)

Nu Maid polish may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, July, 1927.)

Odorex, a deodorant, manufactured by the Flint-Holden Sales Co., Detroit, Mich., may be transported on steamers carrying passengers, without restriction, and can be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Odorono may be transported, without restriction, on steamers carrying passengers. (Ruling, December, 1918.)

Oil, asphaltum, which will not ignite at a temperature less than 110° F., may be carried under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, February, 1912.)

Oil, banana. *See* Amyl acetate.

Oil, crude. *See* Petroleum, crude.

Oil, cylinder. *See* Cylinder oils.

Oil, dynamo. *See* Dynamo oil.

Oil, fuel and road, produced from crude petroleum by a process of refining, and that will not ignite at a temperature less than 110° F., may be carried on steamers carrying passengers under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, January, 1912.)

Oil, fuel, packed in wooden barrels, shall not be carried on passenger steamers as stores or cargo. (40488 and 47781.)

Oil, high-test fuel, may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, August, 1911.)

Oil, illuminating; kerosene or other illuminating oils meeting the requirements of the law must be stored in metallic tanks or cans and carried in the oil rooms or lamp lockers constructed in accordance with the general rules and regulations. (Ruling, May, 1918.)

Oil, illuminating, with low flash and fire points. Oil with a fire point of 145° F. and a flash point of 112° F. should not be used as stores on any vessel, and, although this service has no jurisdiction in the matter of oil used as stores on other than passenger and pleasure steamers, it is suggested that oil used for illuminating purposes should have a fire point of not less than 300° F. (Ruling, May 8, 1915, file 70692.)

Oil, lubricating, may be stored as heretofore in secure tanks, casks, or cans in the engine-room compartments or storeroom, or in metal-lined lamp lockers or oil room. (Ruling, May, 1918.) (See rulings on certain specified lubricating oils.)

Oil, lubricating, Penzoil Co., may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, lubricating, 600° test oil, Crystal Oil Works, may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, lubricating, 600° flash oil, Independent Refining Co., may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, lubricating, medium auto oil No. 1356, Independent Refining Co., may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, marine No. 10, 400° test. *See* No. 10 marine oil.

Oil, mineral colza, mineral sperm, spermoline, and 300° test illuminating oil, may be transported under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting these commodities. Those standing a fire test of 300° F. are not restricted. (Rulings, June, 1914, and April, 1916.)

Oil, mineral seal, is to be classed as refined petroleum, and therefore shall not be used as stores on passenger or pleasure steamers. (Ruling, November, 1915.)

Oil No. 1. *See* Galena-Marine signal oil.

Oil, petroleum, tanners', may be transported under the same conditions as refined petroleum. (45222.)

Oil, petroleum, wool, may be transported under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, July, 1911.)

Oil, shale or paraffin, can not be used for the purpose of operating auxiliary apparatus for electric lighting or wireless equipment. (Ruling, January, 1914.)

Oil, sole leather, may be transported under the same conditions as refined petroleum upon steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, July, 1911.)

Oil, 600° W. *See* W. Oil 600°.

Oiled clothing may be carried on steamers carrying passengers, provided that it is stowed separate and apart from any other cargo, and where it may be easily jettisoned in case of spontaneous combustion. Furthermore, if during manufacture the clothing is treated with linseed oil, it should be thoroughly dried before being submitted for shipment, in order to oxidize the linseed oil and eliminate danger from spontaneous heating. (Ruling, February, 1915.)

Oil of turpentine. *See* Turpentine.

Oil of vitriol. *See* Sulphuric acid.

Oleic acid (Turkey red oil) may be transported on steamers carrying passengers. (Ruling, May, 1915.)

Oleum. *See* Sulphuric acid.

One-minute fire kindlers, made of wood, wire, excelsior and cotton, and fuel oil, and packed in cartons, shall not be transported on steamers carrying passengers. (Ruling, November, 1915.)

Oronite fly spray, submitted by the Standard Oil Co. of California, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1926.)

Oxford metal polish, manufactured by the Crowell Chemical Co., Rutherford, N. J., as it flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers, and it shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Oxone, being mainly sodium peroxide which has been fused into blocks or cakes, and sodium peroxide in powdered form, may be transported on steamers carrying passengers, provided that it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn shall be packed in water-tight metallic case securely boxed in a case of sufficient strength to withstand hard usage, in accordance with the method as submitted to this bureau, and with the further provision that it shall not be stored in a place containing combustible material. Furthermore, such drums should be plainly marked, showing that the material that is contained therein is inflammable and must be stored in a place where there is no combustible material. (Ruling, September and October, 1910.)

Oxygen gas may be transported as a deck load on steamers carrying passengers when contained in cylinders that have passed the inspection of the bureau of explosives and the Interstate Commerce Commission and filled at a pressure not greater than is stipulated by them. (Ruling, September, 1915.)

Paint. *See* Positive seal priming.

Paper caps, detonators, shall not be carried on steamers carrying passengers as stores or cargo. (43366.)

Paraffin oil may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting same. (Ruling, October, 1914.)

Paraffine Paint Co. roofing cement, used in connection with their ready-roofing paper, shall not be transported on steamers carrying passengers or used as stores on such steamers. (Ruling, December, 1916.)

Paraldehyde shall not be transported on steamers carrying passengers. (Ruling, August, 1917.)

Paris green. *See* Arsenic compounds.

Parrot metal polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, September, 1915.)

Patent-leather repairer No. 3. *See* No. 3 Patent-leather repairer.

Patent vulcanite roofing cement shall not be transported on steamers carrying passengers. (Ruling, April, 1917.)

Pathescope motion-picture projector. *See* Popular Model Pathescope motion-picture projector.

Peerless thinner may be transported on steamers carrying passengers, provided it is shipped in sealed drums as required by the Interstate Commerce Commission's specifications, and that the drums are absolutely tight. (Ruling, December, 1917.)

Pep, a liquid insecticide, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, August, 1917.)

Perchloric acid may be transported on steamers carrying passengers, in 1-pound containers, care being taken, however, to place the bottles in tin boxes filled with whiting to neutralize the acid in case of breakage. (70078–71.)

Perchloride of iron (ferric chloride) may be transported without restriction on steamers carrying passengers. (Ruling, November, 1915.)

Perco spray, an insecticide, manufactured by the Prince Chemical Co., Pottstown, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, January, 1927.)

Percussion caps may be transported on steamers carrying passengers, under the same conditions as small-arms ammunition. (Ruling, August, 1913.)

Perolin 15 essence shall not be used as stores on pleasure or passenger steamers nor shall it be transported on steamers carrying passengers. (Ruling, June, 1922.)

Perolin 15 essence, diluted, may be used as stores on pleasure and passenger vessels and may be transported on steamers carrying passengers. (Ruling, June, 1922.)

Peterman's ant food, manufactured by William Peterman (Inc.), New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1922.)

Peterman's discovery liquid, manufactured by William Peterman (Inc.), New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, November, 1922.)

Peterman's discovery paste may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (Ruling, September, 1916.)

Peterman's roach food, manufactured by William Peterman (Inc.), New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, November, 1922.)

Petroleum asphaltum of high flash point is not prohibited by section 4472, Revised Statutes, and may be transported on steamers carrying passengers. (Ruling, April, 1914.)

Petroleum, crude; steamers carrying passengers, using coal as fuel, can not carry crude oil in their double bottoms, as this would be in violation of section 4472, Revised Statutes. It would also be in violation of section 4472, Revised Statutes, for a steamer carrying passengers, using crude oil as fuel, to carry crude oil as cargo in her fuel-oil tanks. (62944.)

Petroleum, crude and refined, shall not be carried as stores or cargo on passenger steamers, except that refined petroleum with flash point of 110° F. or more may be carried under regulations where there is no other practicable mode of transporting it. (R. S.)

Petroleum ether shall not be carried on passenger steamers as stores or cargo. (70078–71.)

Petroleum pitch, submitted by the North American Chemical Co., Boston, Mass., may be transported on steamers carrying passengers, when packed in strong, tight barrels and properly stowed. (Ruling, March, 1924.)

Phenoid, paint and varnish remover, may be transported on steamers carrying passengers, under the same conditions as varnishes. The ruling in reference to varnishes is in accordance with the regulations of the Interstate Commerce Commission. (Ruling, August, 1926.)

Phenoid, type cleaner, manufactured by the Chalmers Chemical Co., Newark, N. J., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Phenol. *See* Carbolic acid.

Phenola, a coal-tar disinfectant, manufactured by Hemingway & Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, February, 1925.)

Phenolene, a disinfectant, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Phenyl isocynate may be transported on steamers carrying passengers, under the same conditions as refined petroleum, care being taken, however, to stow it on deck. (Ruling, August, 1927.)

Phosphoric acid, anhydrous, carbonized, and glacial, may be transported on steamers carrying passengers when it is stowed on deck, where it is at all times under the eye of an officer of the vessel, and where it can be easily jettisoned in the event of necessity. (Ruling, October, 1923.)

Phosphoric acid paste may be transported on steamers carrying passengers. (Ruling, September, 1916.)

Phosphorus, sesquisulphide of, and amorphous (red) may be transported on steamers carrying passengers, provided that these commodities are stowed in iron drums or tins in cases and carried on deck. (Rulings, August and September, 1915.)

Phosphorous trichloride may be transported on steamers carrying passengers, under the same conditions as sulphuric acid. (Ruling, June, 1920.)

Phosphorus, yellow or white, shall not be carried on passenger steamers as stores or cargo. (Ruling, September, 1913.)

Picric acid, containing 10 or 20 per cent water, shall not be carried on passenger steamers as stores or cargo. (Ruling, October, 1914.)

Pine tar acid, a disinfectant, manufactured by the export department, Barrett Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure vessels. (Ruling, March, 1925.)

Pine tar oil, having a flash point of 300° F., may be transported on steamers carrying passengers. (Ruling, October, 1914.)

Pintsch gas (Isolite) is not prohibited from being carried on steamers carrying passengers by section 4472, Revised Statutes. (Ruling, April, 1915.)

Pioneer liquid asphalt roofing cement may be transported on steamers carrying passengers. (Ruling, February, 1917.)

Pitch, as submitted by the Standard Oil Co. of New Jersey, may be transported on steamers carrying passengers. (Ruling, April, 1915.)

Pitch, solid. *See* Solid pitch.

Pixbrite, a liquid metal polish manufactured by Albert Pick & Co., of Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1924.)

Pluvinox roofing cement may be transported on steamers carrying passengers. (Ruling, August, 1916.)

Police grenade, as manufactured by the Lewis-Hughes Co., Chicago, Ill., or anything like it, shall not be transported on steamers carrying passengers. (Ruling, September, 1922.)

Polish-ol furniture polish may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

Popular model Pathescope motion-picture projector may be installed on steamers carrying passengers under the jurisdiction of the Steamboat Inspection Service, when installed in booths constructed in accordance with the specifications that have heretofore been adopted (see Bulletins Nos. 67 and 87). This projector is allowed to use only acetate-cellulose films. (Ruling, August, 1921.)

Positive seal priming, bituminous solution, boiler and stack paint, Trinidad marine paint No. 1, Trinidad marine paint No. 2, Trinidad marine paint No. 3, Genasco asphaltum varnish structural paint, positive seal damp-proof, black roof paint, Barber brand liquid asphalt-A, and bituminous solution (primer for steel) may be transported on steamers carrying passengers, under the same conditions as spirits of turpentine. Under the provisions of section 4472, Revised Statutes, spirits of turpentine may be carried on steamers carrying passengers, when put up in good metallic vessels or casks or barrels well and securely bound with iron and stowed in a secure part of the vessel. (Ruling, February, 1919.) It is also ruled that if these commodities are contained in tight tin cans which are, in turn, incased in a wooden box, that method of packing will meet the requirements of the law with reference to the commodities being put up in good metallic vessels. (Ruling, March, 1919.)

Potassium bichromate (potassium bi- or di- chromate) may be transported on steamers carrying passengers, without restrictions, when carried as a deck load and packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 50 pounds. (Ruling, October, 1918.)

Potassium chlorate may not be transported in bulk on steamers carrying passengers. In lots of 5 pounds or less, not over 1 pound in a bottle carefully packed and cushioned in separate cases, it may be accepted for transportation. It should not be packed in the same case with other chemicals. Compositions containing potassium chlorate may be accepted for transportation in the same case with ordinary dry inorganic chemicals when the percentage of chlorate is not over, say, 10, and when packed in amounts of not over 1 pound in a bottle, not in more than 5-pound lots, provided the composition contains no other article of like dangerous character, no sulphur, charcoal, or organic compound of any kind, or any other readily oxidizable substance. When the percentage of chlorate is over, say, 10, the regulations governing chlorate of potash should apply and also the restrictions as to admixture of sulphur, charcoal, organic compounds, etc., of the foregoing sentence. (Ruling, November, 1914.) Chlorate of potash, unmixed with combustible matter, can not be considered a like explosive, burning fluid, or like dangerous article to those enumerated in section 4472, Revised Statutes, and accordingly, when properly confined in suitable containers, its transportation on passenger vessels is not prohibited. (Ruling, January, 1915.)

Potassium nitrate, saltpeter, nitrate of potash, may be transported on steamers carrying passengers when packed in drums, boxes, or casks and carried as a deck load. (Ruling, October, 1918.)

Potassium permanganate may be transported on steamers carrying passengers, when carried as a deck load and when packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 25 pounds. (76253.)

Potassium zanthate may be transported on steamers carrying passengers. (Ruling, March, 1927.)

Power's motion-picture projector is approved for use on vessels under the jurisdiction of this service, subject to the following conditions: The projector shall be inclosed in a booth constructed in accordance with specifications previously approved (see bulletin dated January 2, 1923). The inflammable (nitrocellulose) or the slow-burning (acetate cellulose) film may be used within the booth. The machine shall use the filament-type lamp consuming a maximum of about 1,000 watts with the 30-ampere rheostat. Where the rheostat is used, a suitable guard shall be installed to prevent film or scraps of film from coming in contact with the dangerously hot portions of the rheostat casing. (Ruling, September, 1923.)

Preservative shingle stain may be transported on steamers carrying passengers, under the same conditions as turpentine; that is, that it be packed in good metallic vessels or casks or barrels, well and securely bound with iron, and stowed in a secure part of the vessel and marked with name. (Ruling, May, 1923.)

Preservo, manufactured by the Robeson Preservo Co., Port Huron, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, February, 1926.)

Prest-O-Lite tanks containing acetylene are to be stamped with thickness and tensile strength of the material of which composed, also with the words "Acetylene compressed into porous substance," together with the name of the firm or company by whom the tanks have been charged. The tanks shall be of not less than 55,000 pounds tensile strength to the square inch and of sufficient thickness of shell to withstand a pressure of 1,200 pounds to the square inch, and charged with acetylene to a working pressure not exceeding 240 pounds to the square inch, said tanks to be completely filled with asbestos disks, the porosity of which shall not exceed 80 per cent. (Ruling, March, 1903.) Regulations are complied with if paper labels are pasted on the tanks. (Ruling, May, 1912.)

Presto metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1914.)

Preventol, manufactured by the Haynes Chemical Corporation, New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1921.)

Primer for steel, bituminous solution. *See* Positive seal priming.

Protane bottled gas may be transported on steamers carrying passengers, provided it is transported in cylinders that comply in all respects with the regulations prescribed by the Interstate Commerce Commission for the transportation of such articles by rail. (Ruling, August, 1927.)

Protexol, formerly known as avenarious carbolineum, may be transported on steamers carrying passengers when packed in tin cases which, in turn, are packed in wooden cases, or when put in bulk in steel drums. (Ruling, October, 1918.)

Prufo metalbrite polish, manufactured by the Prufo Products Co., Portland, Oreg., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, September, 1924.)

Puritan metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, September, 1914.)

Pyralin. *See* Nitrocellulose products.

Pyrene fire-extinguisher fluid in quantities may be transported on steamers carrying passengers, without restriction. (Ruling, August, 1922.)

Pyridine may be shipped on the decks of steamers carrying passengers. (Ruling, April, 1916.)

Pyrofax may be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the requirements of the Interstate Commerce Commission with regard to the transportation of this commodity. (Ruling, March, 1924.)

Pyroxylin plastics. *See* Nitrocellulose products.

Pyxol, a disinfectant, manufactured by the Barrett Manufacturing Co., New York, N. Y., can not be used as stores on any pleasure steamer or steamer carrying passengers but may be transported on steamers carrying passengers, under the same conditions as creosote. (Ruling, November, 1913.)

Quicklime, unhydrated (unslaked), may be transported on steamers carrying passengers, when contained in metal or wooden receptacles, care being taken against hot loading and to protect it from moisture, and provided further that it shall be so stowed as to be able to be easily jettisoned in the event of necessity. This ruling supersedes the ruling as published in Bulletin No. 20, dated June 1, 1917. (Ruling, April, 1926.)

Ramsay's Xtra metal polish and Ramsay's Xtra furniture polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, February, 1918.)

Rapid paint remover, submitted by the Globe Chemical Co., being noninflammable, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

Raven booth for moving-picture projectors is approved for use on passenger steamers and other vessels under the jurisdiction of this service. This booth has been reported favorably upon by the Bureau of Standards, and although it is not constructed in accordance with the amended specifications as published in bulletin dated January 2, 1923, it is constructed in accordance with other specifications that have been approved by this bureau. (Ruling, November, 1923.)

Rayosol, a liquid metal polish, manufactured by E. W. Bennett & Co., is not a dangerous article as contemplated by section 4472, Revised Statutes, and may be transported on steamers carrying passengers. (Ruling, November, 1912.)

Red Cap metal polish, manufactured by the C. M. Kimball Co., Winthrop, Mass., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1926.)

Red ebolastic waterproofing compound may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1922.)

Reliance marine illuminating oil may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Renown metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1916.)

Residium of cottonseed oil is not a dangerous article as contemplated in section 4472, Revised Statutes, and it may be transported on steamers carrying passengers. (Ruling, November, 1911.)

Revivo paste metal polish, manufactured by the Heaney Manufacturing Co., Boston, Mass., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Rex nickel polish, manufactured by the Armiger Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1926.)

Rid, an insecticide, manufactured by the Guarantee Exterminating Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1927.)

Roof coating paint, manufactured by the Ruberoid Co., may be transported on steamers carrying passengers, under the same conditions as spirits of turpentine. (Ruling, February, 1924.)

Roofing cement, general ruling, should have a flash point of not less than 110° F. and a fire point of not less than 110° F., to be transported on steamers carrying passengers. (68490.) Roofing cement that has been approved by the Bureau of Transportation on steamers carrying passengers may be inclosed in rolls of roofing paper and so transported on such steamers. (Ruling, January, 1917.)

Roofing cement. *See* separate rulings on individual cases, according to name.

Rosin oil, manufactured by the National Rosin & Size Co., Savannah, Ga., may be transported on steamers carrying passengers, when shipped in substantial tight containers. (Ruling, November, 1920.)

Royal Saxon metal polish, paste and liquid form, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1927.)

Rubber cements may be transported in good, strong, tight barrels on steamers carrying passengers, on deck, convenient for jettison in case of emergency, or if stowed in a properly constructed magazine safely removed from fire. (Ruling, June, 1927.)

Rudensey safety metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, March, 1915.)

Salt cake. *See* Sodium sulphate.

Saltpeter. *See* Potassium nitrate.

S. & F. Colza burning oil may be used as stores on passenger and pleasure steamers and may be transported on passenger steamers. (Ruling, June, 1916.)

Sassafras oil of camphor having a flash point (by "Tagliabue's Cup Tester") of 200° F. may be transported on steamers carrying passengers. (Ruling, September, 1914.)

Sea clean metal polish, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1926.)

Sella-Todo roofing cement may be transported on steamers carrying passengers. (Ruling, May, 1916.)

Shellac, orange and white, may be transported under the same conditions as varnishes. The ruling with reference to varnishes reads as follows: "Varnishes may be transported on steamers carrying passengers, when packed in accordance with the regulations of the Interstate Commerce Commission. Varnish shall not be stowed in the hold with cotton but, on a ship carrying cotton, should be stowed on deck in such position that it may be easily jettisoned." (Ruling, April, 1926.)

Shellac, orange, standard B compound, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Shells, high-explosive, shall not be transported on passenger steamers as stores or cargo. (Ruling, November, 1910.)

Shepard fly and insect killer, submitted by the Shepard Chemical Co. (Inc.), New York, N. Y., shall not be transported on steamers carrying passengers, nor shall it be used as stores on pleasure or passenger vessels. (Ruling, September, 1922.)

Shepard's liquid insecticide shall not be transported on steamers carrying passengers, or used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Shinola shoe polish paste, when contained in tins packed in well-nailed and iron-strapped wooden cases lined with waterproof paper and stowed in a secure part of the vessel, may be transported on steamers carrying passengers. (Ruling, March, 1912.)

Shinon metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, April, 1919.)

Shi-Nup metal polish, manufactured by the Hirshe Manufacturing Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, December, 1913.)

Shoe filler, manufactured by the Thompson Field Co. (Inc.), Brockton, Mass., may be transported on steamers carrying passengers, care being taken to so stow it as not to be in proximity to excessive heat. (Ruling, November, 1926.)

Shrapnel shells, loaded, with or without fuses attached or the fuses apart, shall not be transported on steamers carrying passengers, either as stores or cargo. (Ruling, July, 1915.)

Signal metal polish, manufactured by the Baltimore Copper Paint Co., Baltimore, Md., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, January, 1928.)

Signet brass and nickel polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, upon routes where there is no other practicable mode of transporting it, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, December, 1914.)

Signet marine metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, January, 1915.)

Signet oil, manufactured by Russian Cement Co., may be used as stores on pleasure and passenger steamers and may be transported on passenger vessels under the same conditions as refined petroleum. (Ruling, August, 1914.)

Silver nitrate may be transported on steamers carrying passengers, when packed in bottles containing not more than 2 pounds, the said bottles being placed in boxes or cases holding not more than 20 or 24 pounds of this commodity, and when packed in this manner may be carried in the hold of the vessel. (Ruling, October, 1918.)

Simplex motion-picture projector is approved for use on steamers carrying passengers and other vessels under the jurisdiction of this service, when installed in booths constructed in accordance with specifications hereto adopted (see Bulletin No. 67). (Ruling, January, 1922.)

Sla'em, an insecticide manufactured by the Sla'em Manufacturing Co., Baltimore, Md., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1927.)

Small-arms ammunition. *See* Ammunition, small-arms.

Soap. *See* Naphtha soap.

Soapeze, submitted by the United States Sanitary Specialties Corporation, Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Sodium arsenate. *See* Arsenic compounds.

Sodium bichromate may be transported on steamers carrying passengers, without restriction, when carried as a deck load and packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 800 pounds. (Ruling, September, 1922.)

Sodium fluoride may be transported on steamers carrying passengers, when packed in suitable tight containers. (Ruling, November, 1917.)

Sodium hyposulphite, sodium thiosulphate, may be transported on steamers carrying passengers, without restriction, when packed in the usual manner followed by the trade. (Ruling, November, 1918.)

Sodium, metallic, may be transported on steamers carrying passengers, provided it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn should be packed in water-tight metallic cases securely boxed in a case of sufficient strength to withstand hard usage, and the case must never be stowed where water can reach it, whether from leaky pipes, spray, or any other way, and it is also further provided that the case shall not be stowed in places containing combustible material. (Ruling, November, 1911.)

Sodium nitrate. *See* Nitrate of soda.

Sodium peroxide may be transported on steamers carrying passengers, provided it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn shall be packed in a water-tight metallic case securely boxed in a case of sufficient strength to withstand hard usage, in accordance with the method as submitted to this service. It is further to be understood that this commodity shall not be stowed in a place containing combustible material and that the case shall be plainly marked, showing that the material that is contained therein is inflammable. (Ruling, April, 1919.)

Sodium sulphate, salt cake, may be transported on steamers carrying passengers. (Ruling, May, 1915.)

Sodium sulphide may be transported on steamers carrying passengers, when contained in bottles holding 1 or 2 pounds each in shipments of mixed chemicals, if surrounded by a sufficient amount of a satisfactory absorbent, such as mineral wool, sifted ashes, or infusorial earth, and larger lots for industrial purposes should be packed in metal drums and carried on deck. (Ruling, April, 1920.)

Sodium sulphide crystals may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Sodium thiosulphate. *See* Sodium hyposulphite.

Solarine metal polish, manufactured by the Solarine Co., Chicago, Ill., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1923.)

Solarine polishing paste may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (Ruling, August, 1917.)

Solid pitch may be transported on steamers carrying passengers. (Ruling, June, 1918.)

Solidified alcohol. *See* Alcohol.

Special deodorizing fluid, manufactured by the West Disinfecting Co., Long Island City, N. Y., shall not be used as stores on steamers carrying passengers or on pleasure steamers, nor may it be transported on steamers carrying passengers. (Ruling, March, 1921.)

Special Enoz moth liquid. *See* Enoz moth liquid, special.

Spic and span metal polish, manufactured by the Atkins Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, January, 1914.)

Spirits of turpentine. *See* Turpentine.

Spray gas, a household insecticide, manufactured by Egbert & Dirig, New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Squibs, electric. *See* Electric squibs.

Stannic chloride may be transported on passenger steamers in 1-pound containers. (70078–71.)

Steamship evaporating fluid and steamship deodorizing fluid, manufactured by the West Manufacturing Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, May, 1921.)

Steamship drip fluid, manufactured by the West Disinfecting Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, May, 1921.)

Steamship insecticide, submitted by the West Disinfecting Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, April, 1922.)

Stearns' electric rat and roach paste, manufactured by the Stearns' Electric Paste Co. (Inc.), Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels when packed in leak-proof containers. (Ruling, February, 1923.)

Sterno, canned heat, may be transported on steamers carrying passengers, under the same conditions as solidified alcohol. (Ruling, December, 1925.)

Sulphate of aluminum not being a like dangerous article to those enumerated in section 4472, Revised Statutes, this service has no jurisdiction concerning its transportation on steamers carrying passengers. (Ruling, November, 1927.)

Sulphate of ammonia. *See* Ammonia sulphate.

Sulphate of copper may be transported on steamers carrying passengers. (Ruling, January, 1917.)

Sulphur, when properly packed, is not prohibited from being carried on passenger steamers. (Ruling, October, 1914.)

Sulphur dioxide, liquid, may be transported on steamers carrying passengers, when contained in steel or iron cylinders capable of withstanding an internal pressure of 450 pounds to the square inch, it being further provided that the cylinders shall be handled without undue jarring, and that they be stored where their temperature can not be raised above 140° F., and that the cylinders be distinctly marked on the outside with the name or description of the article therein. (Ruling, February, 1912.)

Sulphuric acid may be transported on steamers carrying passengers, when packed securely in glass bottles of not more than 5 pints capacity, well cushioned, and separate from all other chemicals, or in small iron drums. Sulphuric acid in 1-pint bottles, but not more than five bottles in one lot, may be shipped in the same case with other chemicals of a similar nature, if surrounded by a sufficient amount of a satisfactory absorbent, such as mineral wool, sifted ashes, or infusorial earth. All such cases should be labeled "Acid." It may be transported in bulk on steamers carrying passengers, when contained in drums or carboys and carried on the decks of such vessels. (Ruling, October, 1918.)

Sulphuric ether shall not be transported on steamers carrying passengers, either as stores or cargo. (Ruling, February, 1913.)

Sun metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, June, 1915.)

Sunny top metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, December, 1914.)

Sun-Ray metal polish, manufactured by the Sun-Ray Sales Co., Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1926.)

Superphosphate is not prohibited by section 4472, Revised Statutes, from being carried on steamers carrying passengers. (Ruling, December, 1914.)

Superior metal polish can not be used as stores on any pleasure or passenger steamer and may only be transported on steamers carrying passengers, under the same conditions as refined petroleum, on routes where there is no other practicable mode of transporting it. (Ruling, February, 1913.)

Sure pop bedbug liquid, manufactured by Adolph Isaacsen & Son (Inc.), New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Sure pop phosphoric paste, manufactured by Adolph Isaacsen & Son (Inc.), New York, N. Y., may be transported on steamers carrying passengers. (Ruling, October, 1927.)

S. W. disinfectant may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

Sweeping compound, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1924.)

Tartaric acid is not inflammable nor seriously corrosive and may be accepted for transportation when properly packed, in quantities up to 10 pounds, and in the same case with other chemicals when carefully packed and cushioned and inclosed in bottles containing not over 1 pound and not more than five bottles in one case. (40256.)

Taxite paint and varnish remover shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Tetrachloride of tin in crystals is not a like dangerous article to those that are enumerated in section 4472, Revised Statutes, and can, therefore, be transported on steamers carrying passengers, but your attention is particularly invited to the statements made in paragraph 4 of the report of the Bureau of Standards with reference to the possible corrosive properties, and also the possible danger that might be caused to other commodities; and, therefore, if this commodity is transported on steamers carrying passengers, it would be well to stow it as not to cause danger to other commodities. Paragraph 4 of the report of the Bureau of Standards reads as follows: "The solution of the crystals in water contains free hydrochloric acid, which corrodes iron and steel. The solution might also cause damage to other commodities. However, if the containers are strong and tight, there should be practically no hazard in carrying stannic chloride crystals." (Ruling, January, 1924.)

Texaco liquid roofing cement may be transported on steamers carrying passengers. (Ruling, November, 1917.)

Texaco roofing cement shall not be transported on steamers carrying passengers. (Ruling, September, 1917.)

Texaco Texacoat, manufactured by the Texas Co., New York, N. Y., may be transported on steamers carrying passengers, when shipped in perfectly tight containers. (Ruling, August, 1920.)

Thermit may be transported on steamers carrying passengers, when contained in paper bags, packed in wooden boxes, properly and firmly secured. (Ruling, September, 1915.)

Thermoline gas may be transported on steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission, particular care also being taken to stow these cylinders in such manner that they will not be subjected to heat. (Ruling, October, 1917.)

Theroz, manufactured by the Theroz Co., New York, N. Y., may be transported on steamers carrying passengers, when packed in air-tight metal containers. (Ruling, November, 1920.)

Tocoseal roofing cement may be transported on steamers carrying passengers. (Ruling, May, 1916.)

Toluol shall not be transported as stores or cargo on steamers carrying passengers. (Ruling, September, 1914.)

Toxal, manufactured by the Glidden Co., Reading, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. This commodity shall not be used as stores on pleasure or passenger vessels. (Ruling, November, 1923.)

Trinidad asphalt roofing cement may be transported under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, January, 1912.)

Trinidad flux may be transported without restriction on steamers carrying passengers. (Ruling, August, 1914.)

Trinidad Lake asphalt, handled by the Barber Asphalt Paving Co., may be transported on steamers carrying passengers, without restrictions. (Ruling, April, 1921.)

Trinidad liquid asphalt "A" and "B" may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, August, 1914.)

Trinidad marine paint, Nos. I, II, III. *See* Positive seal priming.

Trinitrotoluol shall not be transported as stores or cargo on steamers carrying passengers. (50557.)

Tube patching outfits, sizes Nos. 2 and 3, manufactured by the B. F. Goodrich Co., shall not be transported on steamers carrying passengers. (Ruling, February, 1926.)

Tube repair kit, manufactured by the Goodyear Tire & Rubber Co., Akron, Ohio, shall not be transported on steamers carrying passengers. (Ruling, July, 1922.)

Turpentine, oil, and spirits of, to be carried on passenger steamers, must be packed in good metallic vessels or casks or barrels, well and securely bound with iron and stowed in a secure part of the vessel and marked with name. (R. S.)

Turpentine substitute may be transported on steamers carrying passengers, under the same conditions as turpentine; that is, that it shall be packed in good metallic vessels or casks or barrels, well and securely bound with iron and stowed in a secure part of the vessel and marked with name. (Ruling, May, 1923.)

Twinkle metal polish, manufactured by the Twinkle Polish Co., Brooklyn, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1926.)

Type dross. *See* Lead dross.

Uncle Hiram's brighten-all polish may be used as stores on passenger or pleasure steamers. (Ruling, February, 1916.)

Unhydrated (unslaked) lime. *See* Quicklime.

Universal metal polish paste (Porsum's) may be transported on steamers carrying passengers, when properly packed in metallic cases. (49473.)

Universal shine metal polish, as manufactured by the Universal Specialty Co., San Francisco, Calif., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, January, 1923.)

Universal polishing paste, when packed in metallic cases, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

Universal thinner shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

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Usanco may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

U. S. metal polish may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, January, 1916.)

Valgrinok noninflammable marine metal polish and Valgrinok paste may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, July, 1919.)

Valspar, brushing lacquer, shall not be transported on steamers carrying passengers. (Ruling, August, 1927.)

Varnishes may be transported on steamers carrying passengers, when packed in accordance with the regulations of the Interstate Commerce Commission. The Supervising Inspector General, in a letter to the United States Shipping Board, dated August 19, 1919, advises that varnish shall not be stowed in the hold with cotton but, on a ship carrying cotton, should be stowed on deck in such position that it may be easily jettisoned. (46991.)

Varnish solvent, as manufactured by the Royal National Varnish Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, August, 1923.)

Vegetable creosote, beechwood, may be transported on steamers carrying passengers. (Ruling, December, 1918.)

Vermicide may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (This reverses in part previous ruling.) (Ruling, February, 1916.)

Verm-O-Spray, manufactured by the Verm-O-Spray Products Co., West Haven, Conn., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1923.)

Victor Safety Cinema, a motion-picture projector, is approved for use on passenger steamers and on other vessels under the jurisdiction of this service, only when the projector is inclosed in a booth constructed in accordance with specifications previously adopted (see Bulletins 67 and 87), and when using noninflammable (acetate cellulose) films. (Ruling, March, 1923.)

Vim waterproof belt cement, manufactured by E. F. Houghton Co., Philadelphia, Pa., shall not be transported on steamers carrying passengers. (Ruling, July, 1925.)

Viscoloid. *See* Nitrocellulose products.

Vitrifyx may be transported on steamers carrying passengers, when contained in strong wooden barrels. (Ruling, October, 1917.)

Vulcanizing cement shall not be transported on steamers carrying passengers. (Ruling, June, 1922.)

Vulca patch shall not be transported on steamers carrying passengers. (Ruling, April, 1920.)

Walnut-oil stain shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Warren-Ehret Co. roofing cement, having a flash and fire point of not less than 239° F., may be transported on steamers carrying passengers. (Ruling, November, 1915.)

Waterproof linoleum cement, manufactured by the Atlas Supply Co., Philadelphia, Pa., having a flash and fire point of 59° F., shall not be carried on passenger steamers as stores or cargo. (68490–2 and Ruling, May, 1915.)

Welding compound. *See* Thermit.

White duco paint shall not be transported on steamers carrying passengers. (Ruling, September, 1927.)

White metal polish, manufactured by the C. M. Kimball Co., Winthrop, Mass., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1927.)

Whiz aluminum polish and Whiz metal polish, as at present manufactured by the R. M. Hollingshead Co., Camden, N. J., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Whiz all-rubber patch outfit, manufactured by the R. M. Hollingshead Co., Camden, N. J., shall not be transported on steamers carrying passengers. (Ruling, October, 1924.)

Wilson signal oil may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, March, 1916.)

W. L. and Q. brass polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, August, 1915.)

W. Oil 600° may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Wright's silver cream polish may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1922.)

Wunderbrite metal polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure vessels. (Ruling, September, 1926.)

Xylonite. *See* Nitrocellulose products.

Zenith instant polish, manufactured by the Zip Manufacturing Co., Seattle, Wash., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger steamers. (Ruling, January, 1914.)

Zenith moving-picture projector is approved for use on steamers carrying passengers and other vessels under the jurisdiction of this service when installed in booths constructed in accordance with specifications that have been previously adopted (see Bulletins Nos. 67 and 87). (Ruling, June, 1921.)

Zinc dust may be carried on steamers carrying passengers, if contained in hermetically sealed zinc-lined packages, or packages lined with tin plate or terneplate. (Rulings, September and November, 1914.)

Zing cleansing compound, manufactured by the O. G. W. Corporation, Boston, Mass., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1923.)

Zobelin, a disinfectant, manufactured by the Ernst Zobel Co., Brooklyn, N. Y., may be transported on steamers carrying passengers, without restriction, except that it shall be shipped in absolutely tight containers. (Ruling, November, 1920.)

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## MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF VALVES AND FITTINGS.

Acme Steel Co., Glassmere, Pa.
Adrian Steel Casting Co., Adrian, Mich.
Advance Machine Co., Los Angeles, Calif.
A. Gilbert & Sons Brass Foundry Co., St. Louis, Mo.
Ajax Foundry Co., Anniston, Ala.
Ajax Foundry Co., San Francisco, Calif.
Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.
Albina Engine & Machine Works (Inc.), Portland, Oreg.
Alderton Dock Yards (Ltd.), Brooklyn, N. Y.
Alexander R. Boyce (Inc.), Long Island City, N. Y.
Alex. Miller & Bro. (Inc.), Jersey City, N. J.
Algiers Iron Works, New Orleans, La.
Allen Engineering Co., Memphis, Tenn.
Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Almy Water Tube Boiler Co., Providence, R. I.
American Brown Boveri Electric Corporation, Camden, N. J.
American District Steam Co., North Tonawanda, N. Y.
American Foundry & Construction Co., Pittsburgh, Pa.
American Hoist & Derrick Co., St. Paul, Minn.
American Machine & Manufacturing Co., Atlanta, Ga.
American Marine Equipment Corporation, Elizabeth, N. J.
American Metallurgical Corporation, Philadelphia, Pa.
American Radiator Co., Buffalo, N. Y.
American Shipbuilding Co., Cleveland, Ohio.
American Steam Gauge & Valve Manufacturing Co., Boston, Mass.
American Steel Foundries, Chester, Pa.
American Steel Foundries, Indiana Harbor, Ind.
Ames Shipbuilding & Dry Dock Co., Seattle, Wash.
Anniston Steel Co., Anniston, Ala.
Arthur Tickle Engineering Works, Brooklyn, N. Y.
Astoria Marine & Iron Works, Astoria, Oreg.
Atlantic Basin Iron Works, Brooklyn, N. Y.
Atlantic Steel Castings Co., Chester, Pa.
Atlas Imperial Engine Co., Oakland, Calif.
Atlas Valve Co. (Inc.), New York, N. Y.
A. W. Cadmen Manufacturing Co., Pittsburgh, Pa.
A. W. Cash Co., Decatur, Ill.
Axelson Machine Co., Los Angeles, Calif.
Badenhausen Co., Boundbrook, N. J.
Baker Iron Works, Los Angeles, Calif.
Baker Valve Co., Minneapolis, Minn.
Baldt Steel Co., Wilmington, Del.
Bath Iron Works, Bath, Me.
Bayonne Steel Casting Co., Bayonne, N. J.
Bay Shore Foundry Co., Pensacola, Fla.
Beaumont Iron Works, Beaumont, Tex.
Beaver State Motor Co., Gresham, Oreg.
Benjamin Fox's Sons (Inc.), New York, N. Y.
Bertelsen & Petersen Engineering Co., Boston, Mass.
Best Steel Casting Co., San Francisco, Calif.
Bethlehem Shipbuilding Corporation (Ltd.) (Moore Plant), Elizabeth, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Bethlehem Steel Co., Sparrows Point, Md.
B. Hoffman Manufacturing Co., Milwaukee, Wis.
Bingham & Taylor (W. P. Taylor, successor), Buffalo, N. Y.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Birmingham Iron Foundry Co., Derby, Conn.
Blackwood Electric Steel Corporation, Parkersburg, W. Va.
B. M. Martin Brass Works, New York, N. Y.
Boat Repairing Corporation, New York, N. Y.
Boston Navy Yard, Charlestown, Mass.
Bound Brook Engine & Manufacturing Co., Philadelphia, Pa.
Briggs Engineering Co., Brooklyn, N. Y.
Brunswick Marine Construction Corporation, Brunswick, Ga.
Buckeye Engine Co., Salem, Ohio.
Buckeye Iron & Brass Works, Dayton, Ohio.
Burt Hicks, Portland, Oreg.
California Shipbuilding Co., Long Beach, Calif.
Calumet Foundry & Machine Co., East Chicago, Ill.
Canadian Allis-Chalmers Co., Toronto, Canada.
Cann & Saul, Philadelphia, Pa.
Capstaff-Hunter Turbine Works (Inc.), Hoboken, N. J.
Carlson & Son, New York, N. Y.
Carthage Machine Co., Carthage, N. Y.
Cassidy Co. (Inc.), Long Island City, N. Y.
Catton, Neill & Co., Honolulu, Hawaii.
Central Brass Manufacturing Co., Cleveland, Ohio.
Central Engineering Co., Boston, Mass.
Central Foundry Co., New York, N. Y.
Centrifix Corporation, Cleveland, Ohio.
C. F. Braun & Co., San Francisco, Calif.
Chaplin-Fulton Manufacturing Co., Pittsburgh, Pa.
Charles Hegewald Co., New Albany, Ind.
Charles L. Seabury & Co., Morris Heights, N. Y.
Charles Perkes Co., Philadelphia, Pa.
Charleston Dry Dock & Machine Co., Charleston, S. C.
Chester Steel Casting Co., Chester, Pa.
C. H. Evans Co. (Inc.), San Francisco, Calif.
Clinton Dry Docks (Inc.), Brooklyn, N. Y.
Columbia Machine Works, San Francisco, Calif.
Columbia Manufacturing Co., Columbia, Pa.
Columbia Steel Co., San Francisco, Calif.
Columbian Bronze Corporation, New York, N. Y.
Connolly Steel Casting Co., Chelsea, Mass.
Cornell Steamboat Co., Rondout, N. Y.
Coy Valve Co., Chehalis, Wash.
Craig Foundry Co., Brooklyn, N. Y.
Craig Shipbuilding Co., Long Beach, Calif.
Crane Co., Washington, D. C.
Crosby Steam Gage & Valve Co., Boston, Mass.
C. R. Reichel, San Francisco, Calif.
Crucible Steel Co. of America, Philadelphia, Pa.
Daniel E. Donohue, Buffalo, N. Y.
Danville Iron & Steel Co., Danville, Pa.
Davison Chemical Co., Baltimore, Md.
Dayton Steel Foundry Co., Dayton, Ohio.
Dedman Foundry & Machine Co., Houston, Tex.
Deemer Steel Castings Co., New Castle, Del.
Defoe Boat & Motor Works, Bay City, Mich.
De Laval Steam Turbine Co., Trenton, N. J.
De Mattia Bros., Garfield, N. J.
Department of Docks and Ferries, New York, N. Y.
Detroit Ball Valve Co., Detroit, Mich.
Detroit Brass Works, Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Detroit River Iron Works, Detroit, Mich.
Detroit Shipbuilding Co., Detroit, Mich
Detroit Steel Casting Co., Detroit, Mich.
Diamond Power & Specialty Corporation, Detroit, Mich.
Dibert, Bancroft & Ross Co., New Orleans, La.
D. M. Swain Marine Engine Works, Stillwater, Minn.

Dodge Manufacturing Co., Mishawaka, Ind.
Dodge Steel Co., Tacony, Philadelphia, Pa.
Doran Bros., Seattle, Wash.
Doran Manganese Bronze Co., Brooklyn, N. Y.
Downey Shipbuilding Corporation, New York, N. Y.
Dri-Steam Valve Corporation, Pittsburgh, Pa.
Dubus Co. (Inc.), New Orleans, La.
Duquesne Steel Foundry Co., Pittsburgh, Pa.
Eagle Brass Foundry Co., Seattle, Wash.
Eastern Steel Castings, Newark, N. J.
Easton Tool & Machine Co., Easton, Pa.
Eaton Iron Works, Lakeland, Fla.
E. A. Williams & Son, Jersey City, N. J.
Economy Iron Works (Inc.), New Orleans, La.
Edw. Renneburg & Sons Co., Baltimore, Md.
E. J. Codd Co., Baltimore, Md.
Elizabeth City Iron Works & Supply Co., Elizabeth City, N. C.
Elsesser Engineering Co., Brooklyn, N. Y.
Empire Foundry Co., Oakland, Calif.
Enterprise Brass Foundry Co., Los Angeles, Calif.
Enterprise Brass Foundry, Seattle, Wash.
Enterprise Brass Works, Baltimore, Md.
Enterprise Foundry Co., San Francisco, Calif.
Erie City Iron Works, Erie, Pa.
Erie Forge Co., Erie, Pa.
Essex Foundry Co., Newark, N. J.
Everlasting Valve Co., New York, N. Y.
Everett Steel Co., Everett, Wash.
Excelsior Brass Works, San Francisco, Calif.
Exeter Machine Works, West Pittston, Pa.
Farrar & Trefts (Inc.), Buffalo, N. Y.
Farrell-Cheek Steel Foundry Co., Sandusky, Ohio.
Federal Shipbuilding Co., Kearney, N. J.
Federal Steel Foundry Co., Chester, Pa.
Fernholtz Machinery Co., Los Angeles, Calif.
F. G. Dyer Brass Foundry & Machine Works, San Francisco, Calif.
F. H. Koretke Brass & Manufacturing Co. (Ltd.), New Orleans, La.
F. Holtz Co., Evansville, Ind.
Fire Prevention Co., Providence, R. I.
Fitchburg Steam Engine Co., Fitchburg, Mass.
Fleck Bros. Co., Philadelphia, Pa.
Flower-Stephens Manufacturing Co., Detroit, Mich.
Flynn Bros., Hoboken, N. J.
Ford Bros. & Co., Philadelphia, Pa.
Fore River Shipbuilding Co., Quincy, Mass.
Foster Engineering Co., Newark, N. J.
Fox Hill Foundry, Hoboken, N. J.
Freed Heater Co., Collegeville, Pa.
Garden City Foundry Co., Chicago, Ill.
Gas Engine & Power Co., Morris Heights, N. Y.
General Electric Co., Erie, Pa.
General Electric Co., Everett, Mass.
General Engineering & Dry Dock Co., Alameda, Calif.
General Engineering Works, Philadelphia, Pa.
General Fire Extinguisher Co., Auburn, R. I.
General Ordnance Co., Denver, Colo.
George H. Smith Steel Casting Co., Milwaukee, Wis.
George H. Waters Co., Mariners Harbor, N. Y.
George Krouse, Jersey City, N. J.
G. E. Witt Co. (Inc.), San Francisco, Calif.
Gilbert M. Edgett & Co., Brooklyn, N. Y.
Gillett, Eaton & Squire, Lake City, Minn.
Globe Shipbuilding Co., Superior, Wis.
Globe Shipbuilding & Dry Dock Co., Baltimore, Md.
Glover Machine Works, Marietta, Ga.
G. M. Davis Regulator Co., Chicago, Ill.
G. M. Standifer Construction Corporation, Vancouver, Wash.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Goodman Engine & Machine Co., Pittsburgh, Pa.
Grays Harbor Iron & Machine Works, Hoquiam, Wash.
Grays Harbor Iron & Steel Co., Hoquiam, Wash.
Great Lakes Engineering Works, Detroit, Mich.
Great Lakes Towing Co., Cleveland, Ohio.
Greenmount Iron & Manufacturing Co., Baltimore, Md.
Gruendler Machine Co., St. Louis, Mo.
Grymes Engineering Co., Jersey City, N. J.
Gulf Iron Works, Tampa, Fla.
Gulf Machine Works, Pensacola, Fla.
Gyro Metal Works, Norfolk, Va.
Hallidie Co., Spokane, Wash.
H. A. May Foundry Co., Philadelphia, Pa.
Hammel Oil Burning Equipment Co., Providence, R. I.
Hanlon Dry Dock & Shipbuilding Co., Oakland, Calif.
Harlan & Hollingsworth Corporation, Wilmington, Del.
H. Belfield Co., Philadelphia, Pa.
H. E. Crook Co., Baltimore, Md.
Hendricks Manufacturing Co., Seattle, Wash.
Henry Davis & Co., San Francisco, Calif.
Herman J. Scheubner, New York, N. Y.
Herreshoff Manufacturing Co., Bristol, R. I.
Hess-Martin Iron Works, Portland, Oreg.
Hewes & Phillips Iron Works, Newark, N. J.
H. G. Trout Co., Buffalo, N. Y.
Hilles & Jones Co., Wilmington, Del.
H. J. Kaltenthaler, Philadelphia, Pa.
Hodges Boiler & Machine Works Co. (Inc.), Mobile, Ala.
Home Industry Iron Works, Mobile, Ala.
Homestead Valve Manufacturing Co., Pittsburgh, Pa.
Honolulu Iron Works, Honolulu, Hawaii.
Honolulu Welding & Machine Co. (Ltd.), Honolulu, Hawaii.
Hudson Peck Machine Products Co., Philadelphia, Pa.
Hughes Tool Co., Houston, Tex.
Illinois Engineering Co., Chicago, Ill.
Interlake Engineering Co., Cleveland, Ohio.
Ira S. Bushey & Sons, Brooklyn, N. Y.
Isaac G. Johnson, New York, N. Y.
Jahncke Dry Dock & Ship Repair Co., New Orleans, La.
James J. Lacey Co., Baltimore, Md.
James Jones Co., Los Angeles, Calif.
James Rees & Sons Co., Pittsburgh, Pa.
Jarecki Manufacturing Co., Erie, Pa.
J. E. Lonergan Co., Philadelphia, Pa.
Jenkins Bros., New York, N. Y.
Jenkins Manufacturing Co., Bloomfield, N. J.
Jewell Steel & Malleable Co., San Francisco, Calif.
J. F. Duthis & Co., Seattle, Wash.
John H. Dialogue & Son, Camden, N. J.
John J. Tighe Brass & Iron Foundry, Brooklyn, N. Y.
John M. Sullivan Co., New York, N. Y.
John Simmons Co., New York, N. Y.
Johnston Bros., Ferrysburg, Mich.
John W. Barton, Cleveland, Ohio.
John Wood Iron Works, Portland, Oreg.
Joseph B. Taylor Brass Foundry, Baltimore, Md.
Joseph E. Phelan, Brooklyn, N. Y.
Joseph F. Schiller, Philadelphia, Pa.
Joshua Hendy Iron Works, San Francisco, Calif.
Julian D'Este Co., Boston, Mass.
Kelly Valve Co., Muskegon, Mich.
Keystone Iron Works (Inc.), Los Angeles, Calif.
Keystone Supply & Manufacturing Co., Philadelphia, Pa.
Kieley & Mueller, New York, N. Y
Kingsford Foundry & Machine Works, Oswego, N. Y.
Kitson Co., Philadelphia, Pa.
Klingerit (Inc.), New York, N. Y.
Knowlson & Kelley Co., Troy, N. Y.
Kutztown Foundry & Machine Co., Kutztown, Pa.
Lagonda Manufacturing Co., Springfield, Ohio.
Lake Erie Boiler Works, Buffalo, N. Y.
Lake Erie Foundry Co., Buffalo, N. Y.
Lansdale Foundry Co., Lansdale, Pa.
L. De Rome Bronze Foundry, San Francisco, Calif.
Lebanon Steel Foundry, Lebanon, Pa.
Leitelt Bros., Chicago, Ill.
Levering Bros., Baltimore, Md.
Llewelyn Iron Works, Los Angeles, Calif.
Locomotive Superheater Co., New York, N. Y.
Los Angeles Shipbuilding & Dry Dock Co., San Pedro, Calif.
Los Angeles Valve & Fittings Co., Los Angeles, Calif.
Long Island Machine & Marine Construction Co., Long Island City, N. Y.
Louisiana Brass Works, New Orleans, La.

Lucey Manufacturing Corporation of Texas, Houston, Tex.
L. U. Millward Co., Buffalo, N. Y.
Lytton Manufacturing Co., Franklin, Va.
Mabry-Green Foundry & Machinery Co., Beaumont, Tex.
Macaulay Foundry Co., San Francisco, Calif.
Machinery Division, Navy Yard, New York, N. Y.
Madsen Iron Works, Los Angeles, Calif.
Magnus Co. (Inc.), Los Angeles, Calif.
Mahoning Foundry & Machine Co., Punxsutawney, Pa.
Main Street Iron Works, San Francisco, Calif.
Malcolm Foundry Co. (Inc.), Newark, N. J.
Malleable Iron Fittings Co., Branford, Conn.
Manistee Iron Works, Manistee, Mich.
Manitowoc Shipbuilding & Dry Dock Co., Manitowoc, Wis.
Marietta Manufacturing Co., Marietta, Ohio.
Marietta Manufacturing Co., Point Pleasant, W. Va.
Marine Equipment Co., Detroit, Mich.
Marine Equipment Co., Mobile, Ala.
Marine Iron Works, Chicago, Ill.
Marine Manufacturing & Supply Co., Pittsburgh, Pa.
Marine Railway Machine & Boiler Works, Baltimore, Md.
Mark Manufacturing Co., Evanston, Ill.
Maryland Steel Co., Sparrows Point, Md.
Mason Machine Works, Taunton, Mass.
Mason Regulator Co., Boston, Mass.
Materne Manufacturing Co., St. Louis, Mo.
McCormick Bros. Iron Works, San Francisco, Calif.
McDonough Iron Works, Galveston, Tex.
McDougall-Duluth Co., Duluth, Minn.
McDowell Foundry Co., Chicago Heights, Ill.
McKay, Moore & Noble, San Francisco, Calif.
Merchant Shipbuilding Corporation, Chester, Pa.
Merchants & Miners Transportation Co., Baltimore, Md.
Merco Nordstrom Valve Co., New York, N. Y.
Merrill-Stevens Co., Jacksonville, Fla.
Metcalf Iron Works, Brooklyn, N. Y.
M. Greenberg's Sons, San Francisco, Calif.
M. H. Aterite Co. (Inc.), New York, N. Y.
Michigan Steel Casting Co., Detroit, Mich.
Midland Iron & Steel Co., Midland, Ontario, Canada.
Midwest Engine Co., Indianapolis, Ind.
Milwaukee Valve Co., Milwaukee, Wis.
Mitchell Co. (John McAinsh, Prop.), New York, N. Y.
Mobile Pulley & Machine Works, Mobile, Ala.
Montague Iron Works, Chicago, Ill.
Moore & Scott Iron Works, San Francisco, Calif.
Morgan Engineering Co., Jersey City, N. J.
Morgan's Louisiana & Texas Railroad & Steamship Co., Algiers, La.
Morse Dry Dock & Repair Co., Brooklyn, N. Y.
Mueller Metals Co., Port Huron, Mich.
Murray Iron Works, Burlington, Iowa.
Nathan Manufacturing Co., New York, N. Y.
Nathan Manufacturing Co., Parkersburg, W. Va.
National Brake & Electric Co., Milwaukee, Wis.
National Foundry Co., Erie, Pa.
National Shipbuilding Co. of Texas, Orange, Tex.
National Tube Co., Kewanee Works, Kewanee, Ill.
Navy Yard, Philadelphia, Pa.
Navy Yard, Portsmouth, N. H.
Nazareth Foundry & Machine Co., Nazareth, Pa.
Neckar Water Softener Corporation, New York, N. Y.
Nelson Iron Works, Marshfield, Oreg.
Newburgh Steam Boiler Works, Newburgh, N. Y.
Newburgh Steam Boiler Works, St. Louis, Mo.
New England Navigation Co., Newport, R. I.
New Jersey Valve & Fitting Co. (Inc.), Hawthorne, N. J.
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.
New York Brass Foundry Co., New York, N. Y.
New York Engineering Co., New York, N. Y.
New York Harbor Dry Dock Corporation, Rosebank, Staten Island, N. Y.
New York Repair & Supply Co., New York, N. Y.
Nordberg Manufacturing Co., Milwaukee, Wis.
Northern Equipment Co., Erie, Pa.
Northwest Bridge & Iron Co., Portland, Oreg.
Northwest Engineering Works, Green Bay, Wis.
Northwestern Steel & Iron Corporation, Minneapolis, Minn.
Ocean Engine & Boiler Works (Inc.), Brooklyn, N. Y.
Old Dominion Iron Works, Berkley, Va.
Old Dominion Iron Works, Norfolk, Va.
Olympic Foundry Co., Seattle, Wash.
Olympic Steel Works, Seattle, Wash.
O'Malley-Beare Valve Co., Chicago, Ill.
O'Neil Iron Works, Buffalo, N. Y.
Oregon Brass Works, Portland, Oreg.
Oregon-Washington Railroad & Navigation Co., Portland, Oreg.
Pacific American Fisheries, South Bellingham, Wash.
Pacific Brass & Bronze Foundry, San Francisco, Calif.
Pacific Coast Shipbuilding Co., Bay Point, Calif.
Pacific Foundry Co., San Francisco, Calif.
Pacific Marine Iron Works, Portland, Oreg.
Pacific Metal Works, San Francisco, Calif.
Patrick White & Sons, Perth Amboy, N. J.
P. David Co., San Francisco, Calif.
Peerless Foundry Co., Pittsburgh, Pa.
Penberthy Injector Co., Detroit, Mich.
Peninsula Shipbuilding Co., Portland, Oreg.
Peninsular Steel Castings Co., Detroit, Mich.
Penn Steel Casting & Machine Co., Chester, Pa.
Pennsylvania Boiler Works, Erie, Pa.
Pennsylvania Forge Co., Bridesburg, Pa.
Percy S. Capstaff, Woodridge, N. J.
Perth Amboy Dry Dock Co., Perth Amboy, N. J.
Philadelphia Coppersmithing Co., Philadelphia, Pa.
Philadelphia Electric Steel Corporation, Conshohocken, Pa.
Philadelphia Malleable Iron Works, Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.
Philadelphia Steel & Iron Co., Philadelphia, Pa.
P. H. O'Day & Son, New York, N. Y.
Phoenix Foundry & Machine Co., Ashtabula, Ohio.
Phoenix Iron Works, Portland, Oreg.
Phoenix Iron Works Co., Oakland, Calif.
Phoenix Machine Works, Mobile, Ala.
Pierce, Butler & Pierce Manufacturing Corporation, New York, N. Y.
Pier Machine Works, Brooklyn, N. Y.
Pittsburgh Piping & Equipment Corporation, Pittsburgh, Pa.
Pittsburgh Valve & Fittings Co., Pittsburgh, Pa.
Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, Pa.
Point Pleasant Machine Works, Point Pleasant, W. Va.
Portland Bronze & Crucible Steel Foundry, Portland, Oreg.
Pratt & Cady Co., Hartford, Conn.
Providence Engineering Corporation, New York, N. Y.
Puget Sound Machinery Depot, Seattle, Wash.
Queen City Brass & Iron Works, Cincinnati, Ohio.
Quincy Steel Casting Co., Quincy, Mass.
Racine Steel Castings Co., Racine, Wis.
Reading-Bayonne Steel Casting Co., Bayonne, N. J.
Reading Steel Casting Co., New York, N. Y.
Reading Steel Casting Co., Hartford, Conn.
Reading Steel Casting Co., Reading, Pa.
Reading Valve & Fittings Co., Reading, Pa.
Redington Standard Fittings Co., Redington, Pa.
Reliance Steel Casting Co., Pittsburgh, Pa.
Restucci Steam Valve Corporation, New York, N. Y.
Riehl-Johnston Manufacturing Co. (Inc.), Pittsburgh, Pa.
Riverside Steel Casting Co., Newark, N. J.
R. J. Schwab & Sons Co., Milwaukee, Wis.
Roberts Brass Co., Milwaukee, Wis.
Robert Wetherill & Co. (Inc.), Chester, Pa.
Robins Dry Dock & Repair Co., Brooklyn, N. Y.
Rosedale Foundry & Machinery Co., Pittsburgh, Pa.
Ross-Meehan Foundry Co., Chattanooga, Tenn.

Rowe & Davis Engineers (Inc.), New York, N. Y.
Roxbury Steel Castings Co., Boston, Mass.
Rundle Spence Manufacturing Co., Milwaukee, Wis.
Ruppel Machine & Manufacturing Co. (Inc.), New Orleans, La.
Saginaw Shipbuilding Co., Saginaw, Mich.
San Francisco Brass Foundry, San Francisco, Calif.
San Francisco-Oakland Terminal Railway Co., San Francisco, Calif.
Sarco Co., New York, N. Y.
Schantz & Eckert, Perth Amboy, N. J.
Schiller-Nolan Co., Philadelphia, Pa.
Schoellhorn-Albrecht Machine Co., St. Louis, Mo.
Schutte & Koerting Co., Philadelphia, Pa.
Scott Valve Manufacturing Co., Detroit, Mich.
Scranton Electric Steel Co., Scranton, Pa.
Scullin-Gallagher Iron & Steel Co., St. Louis, Mo.
Seaboard Machine Works, Seattle, Wash.
Seattle Brass Co., Seattle, Wash.
Seattle Construction & Dry Dock Co., Seattle, Wash.
Seattle Machine Works, Seattle, Wash.
S. Flory Manufacturing Co., Bangor, Pa.
Sheboygan Machine Co., Sheboygan, Wis.
Shelton Bros., Paducah, Ky.
Sheriffs Manufacturing Co., Milwaukee, Wis.
Simon Scullin, Philadelphia, Pa.
Sivyer Steel Casting Co., Milwaukee, Wis.
Skagit Steel & Iron Works, Sedro-Wolley, Wash.
Skinner Shipbuilding & Dry Dock Co., Baltimore, Md.
Smith & Watson Iron Works, Portland, Oreg.
Southern Boiler Scaling Co. (Inc.), New Orleans, La.
Southern Pacific Co., Sacramento, Calif.
South Florida Foundry & Machine Works, Orlando, Fla.
Southwestern Shipbuilding Co., East San Pedro, Calif.
Spedden Shipbuilding Co., Baltimore, Md.
Spence, Smith & Kootz Co., Parkersburg, W. Va.
Spencer Heater Co., Scranton, Pa.
Standard Brass Casting Co., Oakland, Calif.
Standard Bronze Co., Seattle, Wash.
Standard Oil Co. of New York (Marine Dept.), Long Island City, N. Y.
Standard Process Steel Corporation, Phillipsburg, N. J.
Standard Shipbuilding Corporation, Mariners Harbor, Richmond. Borough, N. Y.
Standifer Construction Corporation, Portland, Oreg.
Stanley G. Flagg & Co., Philadelphia, Pa.
Star Brass Manufacturing Co., Boston, Mass.
Star Brass Works, Seattle, Wash.
Staten Island Shipbuilding Co., Port Richmond, N. Y.
Steiger & Kerr Stove & Foundry Co., San Francisco, Calif.
Stern Foundry & Machinery Co., New Orleans, La.
Stevens & Normand, New York, N. Y.
St. Louis Iron & Machine Works, St. Louis, Mo.
St. Louis Steel Foundry Co., St. Louis, Mo.
Stockham Pipe & Fittings Co., Birmingham, Ala.
Strong Steel Foundry Co., Buffalo, N. Y.
Sumner Iron Works, Everett, Wash.
Talbot Boiler Co., New York, N. Y.
Tampa Shipbuilding & Engineering Co., Tampa, Fla.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Taylor-Wilson Manufacturing Co., McKees Rocks, Pa.
Tebo Yacht Basin Co., Brooklyn, N. Y.
Techno Service Corporation, New York, N. Y.
Tennessee Coal, Iron & Railroad Co., Ensley, Ala.
Texas Brass Manufacturing Co., Houston, Tex.
Thayer-Shaver-Gulley Machine Co., Portland, Oreg.
The Acme Machine Co., Galveston, Tex.
The American Foundry & Manufacturing Co., Frederick, Md.
The Ashton Valve Co., Boston, Mass.
The Atlantic Works, East Boston, Mass.
The Atlas Steel Casting Co., Buffalo, N. Y.
The Babcock & Wilcox Co., Bayonne, N. J.
The Baltimore Drydock & Shipbuilding Co., Baltimore, Md.
The Barber Manufacturing Co., Ashtabula, Ohio.
The Bashlin Co., Warren, Pa.
The Bayer Co., St. Louis, Mo.
The Boston Engineering Co. (Inc.), Boston, Mass.
The Bowler Foundry Co., Cleveland, Ohio.
The Bryigon Steel Casting Co., New Castle, Del.
The Campbell's Creek Coal Co. (Marine Dept.), Dana, W. Va.
The C. E. Squires Co., Cleveland, Ohio.
The Chapman Valve Manufacturing Co., Indian Orchard, Mass.
The Charles Barnes Co., Cincinnati, Ohio.
The Charles Ward Engineering Works, Charleston, W. Va.
The Cincinnati Steel Casting Co., Cincinnati, Ohio.
The Commercial Steel Castings Co., Marion, Ohio.
The Consolidated Ashcroft Hancock Co. (Inc.), New York, N. Y., and Chicago, Ill.
The Consolidated Safety Valve Co., Bridgeport, Conn.
The Crown Smelting Co., Chester, Pa.
The Dayton Steel Foundry Co., Dayton, Ohio.
The Diez & Roemers Brass Co., Baltimore, Md.
The Dravo Contracting Co., Pittsburgh, Pa.
The D. T. Williams Valve Co., Cincinnati, Ohio.
The Eckenroth Valve & Manufacturing Co., Philadelphia, Pa.
The Edna Brass Manufacturing Co., Cincinnati, Ohio.
The Edward Valve & Manufacturing Co., Chicago, Ill.
The Electric Steel Foundry Co., Portland, Oreg.
The Ellicott Machine Corporation, Baltimore, Md.
The Fairbanks Co., Binghamton, N. Y
The Fairbanks Co., New York, N. Y.
The Falk Co., Milwaukee, Wis.
The Ferrochem Co. (Ltd.), New York, N. Y.
The Filer & Stowell Co., Milwaukee, Wis.
The Fisher Governor Co. (Inc.), Marshalltown, Iowa.
The Flour Ornamental Iron Co., Minneapolis, Minn.
The Frederick Iron & Steel Co., Frederick, Md.
The Frisbie Engine & Machine Works, Cincinnati, Ohio.
The Gardner Governor Co., Quincy, Ill.
The Gauld Co., Portland, Oreg.
The Gibson & Kirk Co., Baltimore, Md.
The Griscom-Russell Co., New York, N. Y.
The Hancock Inspirator Co., Boston, Mass.
The Hayden & Derby Manufacturing Co., New York, N. Y.
The Hooven Owens Rentschler Co., Hamilton, Ohio.
The Hope Forge & Machine Co., Mount Vernon, Ohio.
The Huxley Bronze Casting Co., Philadelphia, Pa.
The Iowa Machine Works, Clinton, Ohio.
The James F. Powers Foundry Co., Elkton, Md.
The Johnson Iron Works (Ltd.), New Orleans, La.
The Kappler Fox Foundry Co., Philadelphia, Pa.
The Kelly & Jones Co., Greensburg, Pa.
The Kennedy Valve Manufacturing Co., Elmira, N. Y.
The Leslie Co., Lyndhurst, N. J.
The Lima Steel Castings Co., Lima, Ohio.
The Lorain Castings Co., Lorain, Ohio.
The Ludlow Valve Manufacturing Co., Troy, N. Y.
The Lunkenheimer Co., Cincinnati, Ohio.
The McNab & Harlin Manufacturing Co., New York, N. Y.
The McNab Co., Bridgeport, Conn.
The Merrill Co., San Francisco, Calif.
The Morgan Engineering Co., Alliance, Ohio.
The M. Smolensky Manufacturing Co., Cleveland, Ohio.
The New Jersey Steel Co., Rahway, N. J.
The Oakadee Co., Chicago, Ill.
The Ohio Blower Co., Cleveland, Ohio.
The Ohio Brass Co., Mansfield, Ohio.
The Ohio Injector Co., Wadsworth, Ohio.
The Oscar Krenz Copper & Brass Works, San Francisco, Calif.
The Pittsburgh Foundry Co., Los Angeles, Calif.

The Plains Iron Works, Denver, Colo.
The Prescott Co., Menominee, Mich.
The Prime Steel Co., Milwaukee, Wis.
The Prime Steel Co., San Francisco, Calif.
The Portland Co., Portland, Me.
The Puget Sound Iron & Steel Works, Tacoma, Wash.
The Pusey & Jones Co., Wilmington, Del.
The Richards Iron Works, Manitowoc, Wis.
The Richardson-Phenix Co., Milwaukee, Wis.
The Riverside Steel Casting Co., Newark, N. J.
The Rowland Valve Co. (Inc.), Seattle, Wash.
The Shaw-Kendall Engineering Co., Toledo, Ohio.
The Skinner & Arnold Co., Albany, N. Y.
The Smolensky Valve Co., Cleveland, Ohio.
The Standard Machine Co., Mystic, Conn.
The Strong, Carlisle & Hammond Co., Cleveland, Ohio.
The Swartwout Co., Cleveland, Ohio.
The Tennent Steel Corporation, Tacoma, Wash.
The Titusville Iron Co., Titusville, Pa.
The Toledo Steel Casting Co., Toledo, Ohio.
The V. D. Anderson Co., Cleveland, Ohio.
The William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.
The Wm. Powell Co., Cincinnati, Ohio.
Theo. Smith & Sons Co., Jersey City, N. J.
Thomas Devlin Manufacturing Co., Philadelphia, Pa.
Thomas W. Hooley Metal Works Co., New Orleans, La.
Thompson Bros., San Francisco, Calif.
Thorne Pioneer Co. (Inc.), Brooklyn, N. Y.
Tioga Steel & Iron Co., Philadelphia, Pa.
Todd Dry Dock & Construction Corporation, Tacoma, Wash.
Todd Engineering Dry Dock & Repair Co. (Inc.), New Orleans, La.
Todd Shipbuilding & Dry Dock Co. (Inc.), Mobile, Ala.
Todd Shipyards Corporation (Quintard Plant), New York, N. Y.
Toledo Shipbuilding Co., Toledo, Ohio.
Torrey Roller Bushing Works, Bath, Me.
Treadwell Engineering Co., Easton, Pa.
Trill Indicator Co., Corry, Pa.
Tri-State Foundry & Machine Co., Pittsburgh, Pa.
Tucker Machine Works, Hoboken, N. J.
Union Construction Co., Oakland, Calif.
Union Gas Engine Co., Oakland, Calif.
Union Iron Works, San Francisco, Calif.
Union Machine Co., San Francisco, Calif.
Union Machine Works & Iron Foundry, Philadelphia, Pa.
Union Oil Co. of California, Wilmington, Calif.
Union Shipbuilding Co., Baltimore, Md.
Union Steel Casting Co., Boston, Mass.
Union Tool Co., Torrance, Calif.
Union Water Meter Co., Worcester, Mass.
United Brass Manufacturing Co., Cleveland, Ohio.
United Engineering Works, San Francisco, Calif.
United States Cast-Iron Pipe & Foundry Co., Columbus, Ohio.
Valley Iron Works Co., Appleton, Wis.
Vanadium Metals Co., Groton, Conn.
Variety Iron Works, Seattle, Wash.
Verdon & Co., New York, N. Y.
Virginia Shipbuilding Corporation, Alexandria, Va.
Vulcan Iron Works, Jersey City, N. J.
Vulcan Manufacturing Co., Seattle, Wash.
W. A. Fletcher Co., Hoboken, N. J.
Walworth Manufacturing Co., Boston, Mass.
Warman Steel Casting Co., Los Angeles, Calif.
Washington Iron Works, Seattle, Wash.
Waters Governor Co., Boston, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Waynesboro Metal & Foundry Co., Waynesboro, Pa.
Western Foundry, San Francisco, Calif.
Westinghouse Machine Co., East Pittsburgh, Pa.
White Fuel Oil Engineering Corporation, New York, N. Y.
Willamette & Columbia River Machine Shop, Portland, Oreg.
Willamette Iron & Steel Works, Portland, Oreg.
William E. Williams, New York, N. Y.
Williams Adams Foundry Co., Philadelphia, Pa.
Wilson & Hausler, Montague, Mich.
Wm. C. Ellis & Sons Iron Works, Memphis, Tenn.
Wm. Wharton, jr., & Co., Easton, Pa.
Wright-Austin Co., Detroit, Mich.
W. S. Cahill Co., Baltimore, Md.
W. T. Garrett & Co., San Francisco, Calif.
Wymo Engineering Co., Brooklyn, N. Y.
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.
York Manufacturing Co., York, Pa.

# MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF FUSIBLE PLUGS.

A. F. Mitchell & Son, Chicago, Ill.
A. Harvey's Sons Manufacturing Co., Detroit, Mich.
American Injector Co., Detroit, Mich.
American Lamp & Mine Supply Co., Scranton, Pa.
American Shipbuilding Co., Cleveland, Ohio.
Anchor Brass Works, San Francisco, Calif.
A. Nicholson, Albany, N. Y.
Babcock & Wilcox Co., Barberton, Ohio.
Bath Iron Works (Ltd.), Bath, Me.
Bertelsen & Petersen Engineering Co., Boston, Mass.
Bethlehem Shipbuilding Corporation (Ltd.), San Francisco, Calif.
B. Hoffman Manufacturing Co., Milwaukee, Wis.
Boston Engineering Co., Boston, Mass.
Boston Steam Specialty Co., Boston, Mass.
Buckeye Iron & Brass Co., Dayton, Ohio.
Charles Hegewald Co., New Albany, Ind.
C. H. McCutcheon, Buffalo, N. Y.
Cornell Steamboat Co., Rondout, N. Y.
Crane Co., Bridgeport, Conn.
Deck Bros., Buffalo, N. Y.
Detroit Lubricator Co., Detroit, Mich.
Detroit Shipbuilding Co., Detroit, Mich.
Downey Heating & Supply Co., Milwaukee, Wis.
Dunham Towing & Wrecking Co., South Chicago, Ill.
Eastern Steamship Lines (Inc.), Boston, Mass.
Elisha Webb & Son Co., Philadelphia, Pa.
Erie Railroad Co. (Marine Dept.), Jersey City, N. J.
F. G. Dyer Brass & Machine Works, San Francisco, Calif.
F. H. Koretke Brass & Manufacturing Co., New Orleans, La.
Fries & Co., Buffalo, N. Y.
Garrott Brass & Machine Co., Houston, Tex.
General Fire Extinguisher Co., Providence, R. I.
Gile Tractor & Engine Co., Ludington, Mich.
Gillett, Eaton & Squire, Lake City, Minn.
Glasgow Iron Works & Supply Co., New York, N. Y.
Great Lakes Engineering Works, Detroit, Mich.
H. A. Blake & Son, Cheboygan, Mich.
Hampden Brass Co., Springfield, Mass.
Harper's Brass Works, Portland, Oreg.
H. B. Sherman Manufacturing Co., Battle Creek, Mich.
Hills McCanna Co., Chicago, Ill.
Hoffman & Billings Manufacturing Co., Milwaukee, Wis.
Inter-Island Steam Navigation Co. (Ltd.), Honolulu, Hawaii.
Iowa Machine Works, Clinton, Iowa.
I. Shonberg (Inc.), Brooklyn, N. Y.
James Jones Co., Los Angeles, Calif.
Jerguson Iron Works, Key West, Fla.
J. J. Pickley, Mobile, Ala.
John A. Rohan Boiler Works, St. Louis, Mo.
John Baizley Iron Works, Philadelphia, Pa.
John H. Murphy Iron Works, New Orleans, La.
Johnson Iron Works, New Orleans, La.
Kelly & Jones Co., Greensburg, Pa.
Keystone Brass Co., Erie, Pa.
Kingsford Foundry & Machine Co., Oswego, N. Y.
Kupferle Bros. Manufacturing Co., St. Louis, Mo.
L. Katzenstein & Co., New York, N. Y.
McKinnon Iron Works Co., Ashtabula, Ohio.
McNab & Harlin Manufacturing Co., Paterson, N. J.
Manistee Iron Works, Manistee, Mich.
Marine Engineering Co., Boston, Mass.
Marine Iron & Shipbuilding Works, Duluth, Minn.
Marine Manufacturing & Supply Co., Pittsburgh, Pa.
Maryland Steel Co., Sparrows Point, Md.
Mason Engineering Works (Inc.), New York, N. Y.
Merrill-Stevens Co., Jacksonville, Fla.
M. Greenberg's Sons, San Francisco, Calif.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Monongahela River Consolidated Coal & Coke Co., Pittsburgh, Pa.
Moran Flexible Steam Joint Co., Louisville, Ky.
Morgan's Louisiana & Texas Railroad & Steamship Co., Algiers, La.
Morton Co., San Francisco, Calif.
New Bedford Boiler & Machine Co., New Bedford, Mass.
New Jersey Valve & Fitting Co. (Inc.), Hawthorne, N. J.
New York Shipbuilding Co., Camden, N. J.
Ohio Injector Co., Wadsworth, Ohio.
Oregon Brass Works, Portland, Oreg.
Pacific American Fisheries, South Bellingham, Wash.
Pennsylvania Railroad Co., Hoboken, N. J.
P. H. O'Day & Son, New York, N. Y.
Pittsburgh Coal Co., Pittsburgh, Pa.
Point Pleasant Machine Works, Point Pleasant, W. Va.
Riehl Manufacturing Co. (Inc.), Pittsburgh, Pa.
Riverside Iron Works, Charleston, S. C.
Rodgers Sand Co., Pittsburgh, Pa.
Rundle-Spence Manufacturing Co., Milwaukee, Wis.
Seattle Brass Co., Seattle, Wash.
Sherwood Manufacturing Co., Buffalo, N. Y.
Skinner & Arnold Co., Albany, N. Y.
Southern Brass Manufacturing and Plating Co., Houston, Tex.
Southern Pacific Co., New York, N. Y.
Spence, Smith & Kootz Co., Parkersburg, W. Va.
Spencer Regulator Co., Salem, Mass.
Star Brass Works, Seattle, Wash.
Staten Island Shipbuilding Co., Port Richmond, N. Y.
Stern Foundry & Machinery Co., New Orleans, La.
Sucesores De Abarca, San Juan, P. R.
Tampa Shipbuilding & Engineering Co., Tampa, Fla.
Texas Brass Manufacturing Co., Houston, Tex.
The Ashcroft Manufacturing Co., Bridgeport, Conn.
The Atlantic Works (Inc.), East Boston, Mass.
The Campbell Creek Coal Co., Point Pleasant, W. Va.
The Carnegie Steel Co., Clairton, Pa.
The Chaplin-Fulton Manufacturing Co., Pittsburgh, Pa.
The Charles Barnes Co., Cincinnati, Ohio.
The Coale Muffler & Safety Valve Co., Baltimore, Md.
The Diez & Roemer Brass Co., Baltimore, Md.
The Edro Richardson Brass Co., Baltimore, Md.
The E. W. Vanduzen Co., Cincinnati, Ohio.
The Farnan Brass Works Co., Cleveland, Ohio.
The Griscom-Russell Co., New York, N. Y.
The Hancock Inspirator Co., Boston, Mass.
The Lunkenheimer Co., Cincinnati, Ohio.
The New England Steamship Co., Newport, R. I.
The Portland Co., Portland, Me.
The Richards Iron Works, Manitowoc, Wis.
The Toledo Shipbuilding Co., Toledo, Ohio.
The Wiggins Ferry Co., St. Louis, Mo.
Thomas B. Banner, Chicago, Ill.
T. Murphy Iron Works, Jacksonville, Fla.
Tranter Manufacturing Co., Pittsburgh, Pa.
Union Iron Works Co., San Francisco, Calif.
United States Engineers Office, War Dept., St. Louis, Mo.
United States Lighthouse Service, Detroit, Mich.
Valk & Murdock Co., Charleston, S. C.
Vulcan Iron Works, Cairo, Ill.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Walworth Manufacturing Co., Boston, Mass.
William J. Kennedy Co., New York, N. Y.
William Powell Co., Cincinnati, Ohio.
W. P. Phillips, Boston, Mass.
W. S. Cahill Co., Baltimore, Md.
W. T. Garrett & Co., San Francisco, Calif.

## MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF BOILER TUBES.

Allegheny Steel Co., Breckenridge, Pa.
Babcock & Wilcox Co., Beaver Falls, Pa.
Bethlehem Steel Co., Philadelphia, Pa.
Casey-Hedges Co., Chattanooga, Tenn.
Central Alloy Steel Corporation, Massillon, Ohio.
Chase Metal Works, Waterbury, Conn.
D. Connelly Boiler Co., Cleveland, Ohio.
Delaware Seamless Tube Co., Auburn, Pa.
Detroit Seamless Steel Tube Co., Detroit, Mich.
Emergency Fleet Corporation, Washington, D. C.
Globe Seamless Steel Tubes Co., Milwaukee, Wis.
Heine Safety Boiler Co., Phoenixville, Pa.
Monessen Foundry & Machinery Co., Monessen, Pa.
Monongahela Tube Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Navy Yard, Boston, Mass.
Pittsburgh Seamless Tube Co., Morado, Pa.
Pittsburgh Steel Products Co., Pittsburgh, Pa.
Power Specialty Co., New York, N. Y.
Reading Iron Co., Reading, Pa.
Spang, Chalfant & Co. (Inc.), Pittsburgh, Pa.
Standard Seamless Tube Co., Allentown, Pa.
Superheater Co., New York, N. Y.
The American Brass Co., Waterbury, Conn.
The Ohio Seamless Tube Co., Shelby, Ohio.
The Parkesburg Iron Co., Parkesburg, Pa.
The Tyler Tube & Pipe Co., Washington, Pa.
Traylor Engineering & Manufacturing Co., Allentown, Pa.

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## MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF STEAM AND WATER PIPES.

A. M. Byers Co., Pittsburgh, Pa.
Ballwood Co., New York, N. Y.
Central Tube Co., Pittsburgh, Pa.
Chase Metal Works, Waterbury, Conn.
Clayton Mark & Co., Chicago, Ill.
Cohoes Rolling Mill Co., Cohoes, N. Y.
Delaware Seamless Tube Co., Auburn, Pa.
Flower-Stephens Manufacturing Co., Detroit, Mich.
Ford Bros. & Co., Philadelphia, Pa.
General Pipe & Foundry Co., Atlanta, Ga.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Kerr Machinery Corporation, Detroit, Mich.
Marine Equipment Co., Detroit, Mich.
Mark Manufacturing Co., Chicago, Ill.
Mobile Pulley & Machine Works, Mobile, Ala.
Monessen Foundry & Machine Co., Monessen, Pa.
National Tube Co., Pittsburgh, Pa.
Northern Equipment Co., Erie, Pa.
Pittsburgh Steel Products Co., Pittsburgh, Pa.
Reading Iron Co., Reading, Pa.
Republic Iron & Steel Co., Youngstown, Ohio.
South Chester Tube Co., Chester, Pa.
Spang, Chalfant & Co. (Inc.), Pittsburgh, Pa.
United States Cast Steel & Foundry Co., Columbus, Ohio.
Victory Manufacturing Co., Niles, Calif.
Wheeling Steel Corporation, Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

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